

CHILD PSYCHOLOGY

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To

THE MEMORY OF
MY MOTHER

PREFACE

TO SECOND EDITION

THE present edition of this book, like the first edition written nearly ten years ago, presents an American functionalistic point of view. I hope that my psychological thinking has matured somewhat as the science has developed during these years, but actually the main developments in the general field have been calculated to strengthen rather than to challenge a functionalistic position.

Of the fifteen chapters in this edition eight are either entirely new, or represent a new organization and treatment of materials. The Introduction has been rewritten. The second chapter presents a biography of a five-year-old based on an original diary. Chapters Three, Four, and Five present a new treatment of the rôle of heredity in mental development. The next two chapters, dealing with individual differences and with general intelligence, are entirely new ones added at the request of teachers who have used the book. The thirteenth chapter, on the significance of problems in mental life, is a reorganization of materials in relation to the "mental hygiene" of childhood.

The remaining seven chapters have been altered in accordance with new research, which in this recent period has been particularly rich and fruitful. Some criticism of older theories has been omitted, as being no longer necessary. The chapter in the original edition on the causes of delinquency has been omitted, not because I do not think the material is valuable, but because I have become convinced that it is too specialized for a book of this sort. The treatment of social behavior has been expanded. I have omitted the chapter on play, but have included much of the material in the new chapter on problems in mental life.

This new edition, like the old, aims to organize and interpret the chief materials in the field of child psychology. The useful task of summarizing or reviewing the materials on various topics has been excellently performed in periodicals and in some texts. This book has a different aim, namely by

presenting a consistent and critical basic interpretation of the field, to stimulate the student to organize his own psychological thinking in an effective way, to the end that he may better evaluate and use the many different sorts of psychological material that are now available or may become available. A student with such a critical equipment should not only be more interested in the developments in this fascinating field: he should also be more ready to modify his ideas as these developments take place, and more flexible in applying psychological generalizations in actual dealings with children.

In preparing the new edition I have been particularly helped and encouraged by criticisms of particular new chapters made by Harvey A. Carr, George W. Hartmann, Arthur T. Jersild, Leonard Carmichael, Clyde Marshall and Robert Leeper. My husband, Merle Curti, has read the entire manuscript critically and given valiant aid with the proof reading. Finally I want to express my lasting gratitude to students of Smith College for their appreciative and stimulating response to the book over a period of eight years; and to students of Teachers College, Columbia University, who have made me realize, as I never quite have before, the vital importance of child psychology to teachers.

MARGARET WOOSTER CURTI

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CHILD PSYCHOLOGY

CHAPTER I

INTRODUCTION

WE HAVE been living in a period of particularly keen interest in child psychology on the part of intelligent laymen — parents and teachers, artists and preachers, authors, business men, and philosophers. Probably it is partly owing to this popular interest (and partly because professional psychologists have been subject to the same social-intellectual forces as laymen) that professional psychologists have begun of recent years to take a renewed interest in this branch of their field. They have tried to meet the calls for help in solving practical problems by giving wisdom already acquired, and by trying to acquire more. Thus, for example, the development of the mental testing movement was greatly accelerated by the request made of the psychologist Binet by school authorities of Paris for help in diagnosing cases of mental deficiency in the public schools.

AIMS OF CHILD PSYCHOLOGY

The practical aim which underlies much of the work in child psychology is thoroughly legitimate, since the most important aim of child psychology is simply to understand mental development in the child. But to understand means to be able, within the limits of the understanding, to predict. A second chief aim of child psychology, therefore, is to control. We wish to understand the minds of children not primarily for the sake of the experience itself but, when all is said and done, in order that we or others whom we teach may more effectively direct their development. "Vain is the discourse of that philosophy," said Plato in the *Republic*, "by which no human suffering is healed." Applying this to the field of child psychology we would emphasize its

potential value in helping to solve the mental problems of childhood, and in making possible more effective adjustment for all children. But Plato did not mean his phrase to be taken literally. He meant simply that knowledge should be related to the needs of human beings. Child psychology may not only help to solve problems, wisely applied, it should have a positive function also in making for the development of a broader and richer personality in the child.

Although from one point of view all scientific child psychology is ultimately of practical value, it is easy to over-emphasize the practical aim. When the attention of the psychologist is focussed closely on the "human suffering to be healed," he is often too ready to offer as aids instruments which have not been carefully tested, generalizations that may be false and misleading. The history of the mental testing movement in its dealings with such problems as those of delinquency and unemployment affords striking illustrations of this point. The belief that the first "Binet" tests were adequate measures of adult intelligence, and the doctrine that mental deficiency is the chief cause of delinquency, not only brought injustice and suffering to individuals, but delayed needed research on what is really a very complex problem. We have not yet been able to undo the unfortunate effects of the overenthusiastic application of the doctrine of the moron, with its accompanying reliance on testing methods later found to be unreliable.¹

Even from a practical point of view, then, general theory and careful methods of study are seen to be of fundamental importance for child psychology. Especially in the minds of those who believe that in the last analysis all science is essentially a means of satisfying human needs, the building up of sound general theory about human nature comes to be regarded as an eminently practical undertaking. Yet granting this, we may still distinguish, among the serious students of child psychology, a group whose main emphasis is on general theory and method rather than on practical applications. In this group are found psychologists who study child psychology primarily for the light it throws upon general psychology. To understand human nature, we must understand

¹ Margaret W. Curti, "The Intelligence of Delinquents in the Light of Recent Research," *Sci. Mon.*, 1926, 22, 132-138.

its origins and its early development, and the various factors important in that development.

SCIENTIFIC METHOD IN CHILD PSYCHOLOGY

Whatever the immediate aim of the student, then, in studying child psychology, the author would urge that careful observance of the general method of science is of first importance. The application of that method in the field of child psychology encounters special difficulties in addition to those inherent in any scientific work. The vital importance of the subject matter, easily realized because of his affection for children whom he knows or whom he wishes to help, may cause a student to look upon the subject in a more or less sentimental way. But if the exact and complete truth about the child mind is what we wish ultimately to attain, we shall of course wish to maintain the attitude and to use the methods best calculated to secure this end. It has been customary to assume that the scientific attitude should be "fact-finding," impersonal, detached, and as free as possible from emotional bias of any kind. In the writer's opinion this attitude is correct, and is as proper for child psychology as for any other field of psychology. Emotional attitudes, of course — attitudes based on æsthetic, ethical, or personal appreciations — will and should motivate the search for truth; but while that search is in progress its ends are most likely to be attained by the deliberate maintenance of as much objectivity as it is possible to attain.

Another essential feature of scientific method, namely the attempt to secure verified and tested knowledge, holding hypotheses lightly while the testing is going on, is for some people more difficult in child psychology than in the general field. Because this branch of psychology is relatively new, and has attracted so many parents and teachers who *know* children from their own experience, we find in the literature of the subject any number of generalizations which are really based, not on careful, repeated research and critical interpretation, but simply on the common sense experience of the writer. Now such intuitively acquired understanding, such common sense knowledge, is very useful in dealing with children. But it is not science, nor to be relied upon as

science, until it is either thoroughly tested, or stated carefully in a tentative way, and labeled for what it is.

Desirable as fully rational analysis based upon extensive objective study is, it yet remains true that in dealing with topics in child psychology to which that sort of analysis has not yet been sufficiently applied, we must depend for our working hypotheses upon what might be called intuitive judgments based upon racial and individual trial and error. These we must utilize, conscious of what they are, until the science is further developed. Of course we should not want to depend upon kind neighbors, poets, or religious prophets for the final word on any psychological topic; but where psychology itself has nothing definite to say, generalizations based upon practical experience must be our guide.

One of the canons of scientific method, namely that scientists should not as scientists attempt to set standards of value, is frequently violated by writers on child psychology when they tell parents and teachers how children *should* be brought up, and thus lead these grown-ups to believe that they are getting scientific guidance, when as a matter of fact they are simply being given the personal opinions of the psychologist. Now the type of control that is actually exercised will depend entirely upon the values in human life which are considered worthy of attainment. Most scientists do not at present believe that the business of science is to set the standards of value. They arise out of the needs of the human organism, are developed and modified in the clash of motives, and become formulated in language — in proverbs and mottoes or in moral and legal codes — as human beings learn more and more effectively to exercise indirect or ideational control over their environment. The present standards of value of any individual or group are the outcome of a slow growth in social tradition, and they too are subject to change.

Psychology does examine and study the judgments of value prevailing at any time, the conditions of their development, their probable effectiveness in securing adjustment. But as science it does not say which are right and which are wrong. If the scientist is to be effective in searching out the truth and making it applicable, he must be as objective and impersonal as possible, making no judgments of right or wrong, ugly or beautiful. Recognizing that certain values

or ideals for a desirable adult life at present exist, the child psychologist may legitimately point out how psychological principles may be applied in achieving those values. In fact, if ultimate control is a legitimate aim of science, it is a part of his business to point out such applications, since it is only through the testing of hypotheses and theories that their usefulness can be estimated, and genuine advance be made.

SPECIAL METHODS IN CHILD PSYCHOLOGY

A brief critical sketch of some of the leading special methods used in child psychology may help to orient the thinking of the student as he surveys the work in the field. It should also help him to develop a more critical, and at the same time a more appreciative attitude toward that work, than is common in the study of the elementary student whose idea of being scientific is likely to consist in trying to separate the sheep from the goats.

1. **The Biographical Method.** — Even before the middle of the nineteenth century works began to appear which showed a realization of the importance of obtaining detailed and accurate accounts of development in individual children. Thus there gradually came into use the first really scientific method used in child psychology, which may be called the biographical method. The first account of children's early mental development was published by Tiedemann in Germany about 1787, and this was followed by some others which were even more detailed and accurate.²

In 1882 appeared *Die Seele des Kindes* (*The Mind of the Child*), by Preyer, a German physiologist. This was a careful record, made from notes taken down at the time, of important events of the first three years of life of his little son, with suggestions about the probable course of development of children in general. Such facts were noted as reflexes present at birth, time and manner of appearance of first reaction to light, development of the grasping reaction, and the like. Here we have the beginning of first-hand systematic observation of facts, with the explicit suggestion of

² See Carl Murchison and Suzanne Langer, "Tiedemann's Observations on the Development of the Mental Faculties of Children." *Ped Sem. and J. Genet. Psychol.*, 1927, 34 : 205-230.

the value of a plan for continuous controlled observation, not only of children but of animals.³ This is an anticipation of the method developed and used thirty years later by John B. Watson and others in the study of children. It has been used also by many zoölogists and psychologists in that observation of animals which developed into animal psychology and which gave such impetus to the genetic and objective study of mind.

Following Preyer, the biographical method was used by a number of writers with varying degrees of success according to their training and the facilities they had for accurate observation and recording. The record of Perez (*Les Trois Premières Années de l'Enfant*) is one of the most significant. Miss Shinn's *Biography of a Baby*, a careful and charming account of the first year of life of her niece, is still of genuine value. Other more recent baby biographies such as those by the Scupins and the Sterns in Germany, and that by Professor Dearborn among others in the United States, have contributed valuable data.⁴

In certain definite ways the usefulness of the biographical method is limited. In the first place, even the most scientific parent is likely to be biased in his selection of events to record, if not in his observation, by love for the child and desire to have him excel. Again, because of lack of time or definite planning, the observation is likely to be only casual, and much that is important may be missed. For example, the steps of learning behind a given bit of behavior may be entirely overlooked. Then, too, the general lack of experimental control and statistical analysis lessen the reliability of results. One father had noted in the diary that the baby, nine months old, showed a preference for using her right hand, when it occurred to him to see in how many of twenty trials she would reach for a toy with the right hand. In the test, this hand was actually used only forty-five per cent of

³ Wilhelm Preyer, *The Mind of the Child*, trans. by H. W. Brown, Appleton, 1890.

⁴ Bernard Perez, *La Psychologie de l'Enfant; Les Trois Premières Années de l'Enfant*, Paris, Bibliothèque de Philosophie Contemporaine, 1891; Milcent Shinn, *Biography of a Baby*, Houghton Mifflin, 1900; G. V. N. Dearborn, *Moto-Sensory Development*, Warwick and York, 1910; Ernst and Gertrud Scupin, *Bubi's erste Kindheit*, Grieben, Leipzig, 1907; William and Clara Stern, *Monographien über die seelische Entwicklung des Kindes*, Leipzig, Barth, 1907, 1909.

the time. A fourth and probably the most important limitation of the biographical method is its slowness. The technique of observation up to this time has not been sufficiently standardized to make possible mass treatment of the data. Even though the method of observation is now being standardized, progress by this method is bound to be slow.

In spite of those disadvantages, however, the biographical method is of great value, particularly for the psychology of early childhood. The study of complete biographies — carried further, to be sure, than most of those that we now have — may be expected to throw important light not only on growth and early development, learning, and individual differences, but on the origin and development of personality traits and types, and upon general problems of intelligence, temperament, and character. The biographical method should be increasingly valuable as supplementing other methods, as suggesting problems for research, and above all as a means of giving us a realistic understanding of the growth of the “whole child.”

2. The Questionnaire Method and the Child Study Movement. — At about the time Preyer's book appeared, G. Stanley Hall, “father of the child study movement,” was making in Boston an investigation of “the contents of children's minds.” This proved to be a very important contribution to the methodology of child psychology.⁵ It was based on an investigation in Germany conducted by the Berlin Pedagogical Society in 1869 and made use of the same method, modified in such a way as to be usable with the American school children. This was the famous questionnaire method. Four Boston kindergarten teachers questioned the children in groups of three, following a list of one hundred and thirty-four questions designed to test the child's knowledge of the world, such as “Have you seen a sheep?” “Where are your ribs?” “Have you seen a bricklayer at work?” “Have you saved cents at home?” When the child reported that he had seen such and such a thing, supplementary questions were asked, such as “How large is it?” “What color?” and the like. The answers were recorded. For each object the child was credited with either knowing or not

⁵ G S Hall, “The Contents of Children's Minds,” *Ped Sem & J Genet Psychol*, 1890, 1 139-173

knowing the concept, although it is apparent there must often have been doubt in the mind of the questioner. Besides these four examiners, about sixty other teachers reported results from using the same list. Results from more than two hundred children were presented. The most important result of this study was its revelation of the meagerness and inaccuracy of the ideas of young children, even when the corresponding words are glibly used. The educational application was strikingly clear, and the work proved very stimulating to teachers.

Another form of the questionnaire method as developed by Hall was much more commonly used than this method of direct questioning. To save time and trouble the questions were printed on blanks, with spaces left in which adults reported childhood experiences or observations of children, or school children themselves filled in the answers. In this way it was possible quickly to obtain a very large number of answers. These were often elaborately classified and presented in statistical form in tables and graphs.

There are many sources of error in the method in either of its chief forms. Hall himself, although he introduced it into this country and made enthusiastic use of it for many years, recognized the chief defects of the method. In "The Contents of Children's Minds" he wrote: "The difficulties and sources of possible error in the use of such questions are many. Not only are children prone to imitate others in their answers without stopping to think and give an independent answer of their own, but they often love to seem wise, and, to make themselves interesting, state what seems to interest us without reference to truth, divining the lines of our interest with a subtlety we do not suspect . . . the faculties of some are benumbed and perhaps their tongues tied by bashfulness, while others are careless, listless, or inattentive, and answer at random. Again, many questioners are brusque, lacking in sympathy or tact, or real interest or patience in the work, or perhaps regard it as trivial or fruitless." It is apparent that most of these criticisms apply equally to the printed questionnaire, and when grown-ups are asked for reports on childhood happenings, there is introduced a new source of distortion because of the frailties of memory.

It seems a pity that Hall, aware as he was of the draw-

backs of the method, should yet have placed such reliance on conclusions drawn from its use. False confidence in these conclusions was strengthened by the large number of subjects, the great mass of data, the impressive curves and tables. But it is now pretty generally held that the method as used by Hall and his followers yielded results little more than suggestive, and not at all justifying the mass of generalizations about every phase of child nature which were made freely on the basis of material thus gathered.

Not only were complex problems in psychology dealt with by the questionnaire method, but many sorts of problems of hygiene and health, of religion, education, and home life were investigated. Although in this country a psychologist and his students were leaders and directors in the work of investigation, they were aided by an army of untrained teachers and parents. Under Hall's stimulus the child study movement developed and became organized during the nineties into countless associations and study circles, with meetings and publications. After the end of the century the movement waned. Interest in children has undoubtedly steadily increased, but it gradually became clear that the best way to gain a scientific understanding of them was not through this sort of general study.

The questionnaire method as used in the pioneer days of child study was, in spite of its defects, of considerable value in stimulating interest in children, and sometimes in setting well-defined problems for further study. The formation of hypotheses is of course an essential step in scientific work. Of late years the same method, refined and modified, and with more adequate and critical use of statistics, has yielded very valuable results in child psychology. The questionnaire in some form is the only device we have for obtaining data on aspects of "inner" life such as phantasy.

3. **The Method of Experiment** is of real, although somewhat limited, usefulness in the study of children. A certain amount of experimental work with older children, in which well-defined problems are set and a standard procedure applied to a number of children, has been in progress during the whole of the modern experimental period. For example, by requiring children to report on standard pictures exhibited to them, and to answer definite questions about what

they saw, valuable information has been obtained about the reliability of observation and report in children. The extent to which children, as compared with adults, are subject to illusions, has been studied, individual differences in reaction time, in emotionality, and in perseverance have been investigated, and other problems have been dealt with in various ways.

But children in general are not particularly good subjects. Since, as a rule, they lack developed intellectual interests, it is hard to provide strong enough incentives for continued work. Their attention is easily distracted, and, too, they lack the training in methods of accurate observation which is often requisite. Especially in experiments requiring introspective reports are they likely to be unreliable subjects, not only through lack of technical training in a type of observation which is difficult even for adults, but because they are more suggestible than grown people. Moreover, the use of experimental methods is of limited usefulness for the study of many topics in child psychology, such as personality, because it introduces artificial situations which make the actions of the child unnatural.

Very young children, especially babies, are less likely than older children to be self-conscious and inhibited in experimental situations. They must be used as subjects, moreover, if we are to get first-hand information about the important early stages of development. Since 1917, when John B. Watson began to apply Preyer's suggestions for studying native responses, infants and very young children have been used more and more as subjects for experiment. In his very significant work, which was a stimulus for much later research, Watson followed Preyer in using the general method of continuous controlled observation, beginning at birth.⁶ At a given time the infant was placed in a natural situation, certain aspects of the situation were varied and the responses recorded. For instance, the experimenters presented live animals to infants who had never seen animals, to see if a fear response would occur, and in this way obtained evidence indicating that fear of animals is not a native response. In recent years elaborate apparatus has been used to obtain ob-

⁶ J B Watson and R Rayner, "Studies in Infant Psychology," *Sci. Mon.*, 1921, 13 505-514.

jective records of responses made by infants lying in experimental cribs.⁷ Others have recorded the time and number of trials required by infants to solve simple problems, such as that of obtaining a piece of zwieback by an attached string. Infants are placed in standard situations with other infants to observe the social responses that may occur. By the use of such objective methods it is proving possible to obtain extremely valuable information about early mental development.

At first there was a good deal of resistance to the idea of experimenting with young children, but as the harmless character of the work became evident that resistance, among those familiar with the work, was largely broken down. Experiments on older children, as on infants, usually involve no unnatural strain. They are commonly in the nature of play or school or work situations to which the child responds in the most natural manner. In general, for all the reasons given, the method of experiment, in the study of both infants and older children, involves various limitations and occasions for caution. There is no doubt, however, about the great value of experimentation when it can be used, especially in certain fields, and we may hope for much from the improvement of objective techniques of handling children as subjects.

4 **The Method of Testing** was a natural outgrowth of the early experimental work with children. This method is essentially a procedure involving the application of standardized experimental situations to large numbers of children, or to the same children at different ages. The results are then scored and treated statistically. The method was first worked out in a formal way by Alfred Binet, in order better to detect backward children in the public schools of Paris. Binet and his colleague, Dr. Simon, presented standard problems, puzzles, and other tasks to the subjects, and compared their performance with the average performance of children of the same age. The advantages and defects of the testing method will be brought out in later sections of this book.

Applied at first to the study of individual differences in

⁷ See especially the account of apparatus and method given in the important initial study by the students of A. P. Weiss, *The Behavior of the Newborn Infant*, by K. C. Pratt, A. K. Nelson, and K. H. Sun, Ohio State Univ. Press, 1930.

special capacities and in general intelligence, the method of testing has by this time also come into extensive use for the study of other subjects, such as vocational aptitudes and character traits. The relation of all these general and special abilities to various hereditary and environmental factors is investigated by the aid of statistical treatment of the test scores. It is the increasingly effective statistical treatment which has made this method one of the most valuable we have for the study of the mental life of children.

5 **The Psychophysiological Method**, consisting in the attempt to correlate the general physical and physiological growth of the child with changes in mental life, is of great importance. Studies of embryonic and fetal behavior in animals and in human beings are beginning to throw light on the origin of the reflex or instinctive activity which is basic in mental development, as well as on the general problem of the relative effects of heredity and environment in determining mental and physical traits.

Investigations of the relation between anatomical and mental growth in the child, and of the relation of such growth to the factors of nutrition, exercise, and general health, have also proved very illuminating. For example, it has been shown that some feeble-mindedness formerly attributed to germ-plasm heredity is the result of such factors as birth injuries, or of malnutrition in the fetus or the infant. In this work psychologists and physiologists are beginning to coöperate in an effective way, realizing more and more the artificiality of a sharp division between their respective fields.

6. **Clinical Studies, Especially of Nervous, Mentally Unstable, and Abnormal Subjects**, have proved an important source of data for child psychology. It is probably largely as a result of analyses of the mental history of maladjusted adults that attention has been drawn to the importance of unfortunate emotional experiences in childhood as factors in later maladjustment. Adult analysis, in so far as it really succeeds in disclosing significant childhood memories and showing their relationship to defects of adjustment, must be regarded as a valuable method for child psychology. With the improvement of existing techniques for the recovery of these experiences we may hope for still more significant work.

The growth of the mental hygiene movement in this coun-

try, a movement having its origin in work with mentally disordered adults, has resulted in the establishment of a large number of psychiatric and psychological clinics for children. In these clinics, directed by psychiatrists (physicians who have specialized in mental diseases) or by psychologists, "problem children" as well as some normal children are given thorough examinations, both mental and physical. In an effort to discover the source of the difficulty careful investigations are made of the home and neighborhood environment in which the child grew up. The main aim in the analysis is to trace the genetic history of the trouble. Such thorough study, in the light of the knowledge gained from clinical studies of adults, has contributed a great deal to our knowledge of the origins and growth of maladaptive habits and emotional attitudes.

Although Freud and his followers have had a very important influence in the development of clinical methods for the study of children, they have by no means been the only workers in this field. The objective psychologists and such psychopathologists as Morton Prince have emphasized the importance of the early years and of subconscious impressions, although their interpretations of various adjustments are different. In general, psychologists question the soundness of orthodox Freudian interpretations, and there is a widespread belief on the part of psychologists that the psychoanalysis of children is a very doubtful method of obtaining "information." Children are even more suggestible than adults, and may readily produce just the kind of memories the analyst hopes to get, simply because the latter, through the very form of his questions and his facial expression and tone of voice during the interview, unconsciously suggests the answers. The same thing happens of course, to a lesser degree, in the analysis of adults. And not merely psychoanalysts secure unreliable corroboration of their theories through suggestion; trained psychologists who should know better often rely on very weak "information."

Besides the objection that any analytic method when used with children is likely to produce unreliable data, there is the more serious objection, in the minds of those interested in the welfare of the child, that false and misleading ideas may be implanted in his mind, and his problems multiplied

rather than solved. In spite of our great debt to the Freudians, we should, the author believes, be extremely critical of the practice of psychoanalysis.

7. **The Modified Clinical Method** as used by the Swiss psychologist Piaget in studies of the thinking of normal children seems to the author to be a method of great significance, capable of future use in obtaining data in some parts of the field of child psychology hitherto considered practically inaccessible. Piaget's method, to be described and criticized more fully in a later section of this book, is to make very careful preparation for getting reports from children about their thinking by training examiners rigidly and over a long period to question children while using very careful devices to avoid suggesting answers. The examiner then "talks with" the child, often performing simple experiments or offering puzzles to solve or "games" to play or proverbs to interpret. Data thus obtained are interpreted in the light of carefully thought-out criteria, and conclusions are presented tentatively. Corroborative or negating evidence on the nature of children's thought is sought in a study of their spontaneous questions and remarks, in the memories of adults, and from other sources.⁸

However much we may question Piaget's conclusions, the author believes we must admit such methods to be of great importance in yielding generalizations which, as time goes on, can be checked by the slower method of observation in natural situations. Either we must make some such mighty effort to get at the thinking of the child, or throw up our hands and continue with our usual superficial analysis from the adult point of view.

8 **The Method of Systematic Observation of Children in Natural Situations** has yielded a wealth of important data in recent years. The contemporary nursery school with its generous provision of free play periods affords an excellent opportunity for repeated observation of the same children in the same general surroundings. The psychologist may gather data while watching the children from behind one-way screens, the children not seeing the observer; or the ob-

⁸ The student will be well repaid by a careful study of the introduction to Piaget's *The Child's Conception of the World*, Harcourt, Brace, 1929, pp. 1-32. This contains a careful description of his method.

server, moving freely about in the play space as one of the teachers or helpers, may take records so unobtrusively that the children do not know they are being studied. In this way records have been made of the number and kind of social contacts made by the children, of manifestations of leadership or of sympathy, and of various other traits and conditions. By treating the results statistically in relation to such factors as age, intelligence and occupation of father, and by comparing the scores based on observations with ratings of the same traits or conditions by teachers, it is possible to discover important interrelationships among the factors studied.

This method usually involves considerable expenditure of time, and because there is not experimental control of conditions, there must be careful and extensive statistical analysis of the data. But these disadvantages are far more than offset by the advantage of being able to study the natural and spontaneous behavior of the child. This method of systematic observation in natural situations has yielded particularly valuable data on personality and social behavior.⁹ We need more application of this method to the study of older children, but it is hard to find accessible natural laboratories corresponding to the nursery school.

9 **The Case Study Method.** — The writing of a complete case study, including a statement of the present situation or problem, history of the case, diagnosis, prognosis or prediction, and recommendations, has been a routine method in the sociological study of the delinquent and the mentally abnormal. It has also been used by psychologists in the study of the problem child. Only in recent years, however, has it begun to come into its own as a valuable method in the psychological study of normal children. By this time the case study, usually more or less fragmentary, it is true, is a recognized means for achieving a fuller understanding of individual normal children, and sections containing an analysis of individual cases are now often offered as appendices to factual and statistical articles about child behavior.

The case study method, in synthesizing all the data about

⁹ Good illustrations of the use of this method are, "Social Play among Preschool Children," by Mildred Parten, *Four Abnor and Soc Psychol*, 1933, 28 136-147; and Lois B. Murphy, *Social Behavior and Child Personality, an Exploratory Study of some Roots of Sympathy*, Columbia Univ. Press, 1937.

the individual child gained through other methods, gives us our only means for viewing the personality as a whole. It gives us a picture and a type of knowledge that no other kind of study could give us and it should, in the writer's opinion, be increasingly employed in the scientific study of child psychology.¹⁰

POINTS OF VIEW IN CHILD PSYCHOLOGY

We have said that not only careful method but also sound general theory is fundamental in child psychology as well as in general psychology. In making this point we must insist that no one type of theory, no one point of view, can ever be expected to represent the final truth or to be the only valid point of view. As a matter of fact, as the author has said elsewhere, leaving aside the more personal and emotional and temporary factors which to a greater or less degree influence even scientific thinking, every scientist who approaches his subject is inevitably prejudiced (using the word literally and not in a derogatory sense) by categories of speech, by modes of thought, and by emotional attitudes which are the cultural inheritance of most civilized human beings; by the particular forms of this cultural inheritance which are dominant in his time and in his part of the world; and finally by the more limited types of belief, appreciation, and desire — social and economic, æsthetic, religious and ethical, scientific, philosophical, and religious — which have come to mark his own individual outlook upon the world. Hence a given way of looking at child psychology may be very fruitful to certain people in the light of their interests at the time, but others with different values and different interests may find that the data in the field seem much more significant when viewed in a different way.

Nevertheless it is important for one who wishes to do effective thinking in a given field to achieve this individual outlook, so to organize the field in his thinking that it has vitality and significance for him in relation to the values of life that are for him the leading values. When he has achieved such a point of view the mass of data in the field

¹⁰ See G W Allport's cogent plea for the case study in his book, *Personality. a Psychological Interpretation*, Holt, 1937, pp. 389-398

are for him capable of a far readier use, a far more intelligent assimilation with his knowledge of other fields, than if they were not held together in some unified view. If we wish really to understand the child mind, we must know what we think of mind in general, and of personality; and we must think of these things in relation to the world in which people live and work with others. Otherwise we shall be gaining knowledge about relatively unrelated features of child life, we shall be studying "facts" about the child but not, in the best sense, child psychology as a science.

It is necessary to urge the beginning student that a point of view once worked out will be most useful when it is held rather lightly, and is readily subject to change when new issues are brought to one's attention, new problems engage one's interest, new methods and new data are at hand. Also, no matter what point of view one holds, one should, as a student of science, earnestly seek to do justice to other points of view. No matter how valuable a consistent point of view is, as an aid to thinking, it may become a hindrance if not held in the true spirit of science — critically, open-mindedly, humbly — as a tool for the more effective pursuit of truth. For we must believe that knowledge of the truth — that is, relationships that really are valid, predictions that really help us to understand human beings, information that is really accurate — these things are needed to "heal human suffering." And that point of view which seems most useful for getting at the truth is the point of view one should take for his own, using it for all it is worth as long as it serves this purpose.

It is the author's belief that certain theories of mind which have prevailed in the past, whatever their usefulness for understanding adults, have actually hampered the development of child psychology, and that a person adhering to similar theories today is handicapped in his efforts to understand children's minds. A brief and necessarily limited account of the chief theoretical approaches in psychology may be of some service in explaining this point. The author likes to think of the various points of view in psychology under two headings, structuralistic psychology and functionalistic psychology.

Structuralistic Psychology tends to divide the human

mind (or human nature or human behavior) into elements, or the simplest possible parts or aspects, and to think of these elements, parts, or aspects as present in combinations or groupings of varying degrees of complexity.

1. *The subjectivistic point of view* represents one variety of structuralism. This approach, historically the traditional one, and still close to popular psychological thinking, regards psychology as the science of mind or consciousness. While the mind is of course a whole, say the subjectivists, it must for the sake of scientific understanding be analyzed into its elements, which are simple sensations, feelings, and perhaps simple relational elements. Although there is no such thing as a simple uncomplicated sensation, still by rigorous analysis of one's own consciousness one may observe *relatively* simple sensory processes, and by inference one arrives at the concept of the simple sensation as an element, very much as experimenters in chemistry arrived at the concept of the ion, although no chemist ever has seen or ever will see an ion. Similarly other elementary processes are inferred. More complicated states of consciousness are thought of as "combinations" of elementary processes. But it is not believed that there is any combining agency; rather, mental development is described by most subjectivists as if it were a relatively passive growth from the simple to the complex.¹¹

According to subjectivistic theory the one valid method that psychology can use is that of introspection, or the observation by a person of his own conscious states (including his near-conscious or sub- or co-conscious states when by special techniques such as hypnosis these can be brought to light). Any discussion of physiological processes not reflected in consciousness, or of data about the things and people surrounding and influencing a person, or the conditions affecting his development, are thus considered to be beyond the scope of psychology.

This point of view is perfectly legitimate, granting a certain type of interest, and a definition of psychology as the study of *consciousness*. The author always finds in her classes a few students whose interest quickens and whose grasp of

¹¹ For a theoretical discussion by a subjectivist see E. B. Titchener, "Structural and Functional Psychology," *Phil Rev.*, 1899, 8 290-299; also *Lectures on the Experimental Psychology of the Thought Processes*, Macmillan, 1909

the subject matter seems more sure when matters involving "pure self-observation" are being discussed, such as color sensations, the ways in which people think of numbers to themselves, and the like. Daydreams, which the author believes are among the most important phenomena in human nature, can be studied only by getting the subject's report; and hopes, fears, memories, and ideals that may be decisive in a person's life are observable only by the person experiencing them.

If our aim in studying psychology is, however, not to describe consciousness but to understand human nature, then an exclusive reliance on the method of introspection is seen to involve serious limitations. Many of the forces which stimulate human beings to action and profoundly influence their development as people are not reflected in consciousness. There is much stimulation without sensation; our conscious aims are often very different from the obscure factors that really motivate us; the picture we have of ourselves is very different from the one other people have of us. Human nature is profoundly influenced by physiological, economic, and social conditions the study of which would have to be excluded from a consistently subjectivistic psychology.

Hence even for human adults the subjectivistic approach is a very narrow one. For animals and very young children it is a barren approach indeed, for animals and babies cannot tell us about their inner lives, and young children's reports are necessarily fragmentary and only in small part reliable. Thus a scientific subjective treatment of the psychology of early childhood would have for its main body of conclusions not only unverified hypotheses, but unverifiable hypotheses; it would be highly speculative. Now there is no inherent objection to careful speculation, even if one can never verify it, the only question is whether a psychologist as a psychologist wishes to devote much time to it, or finds it very helpful in understanding human nature. Many do; the author of this book does not. Students should follow, sincerely, their own bent.

Another objection to subjectivism, from the author's point of view, is that it tends to perpetuate a naïve belief in the antagonism between mind and body which is a part of

the cultural inheritance of every western European. Subjectivist psychologists are not likely to be naïve in their beliefs, of course, but they tend to have the dualistic view of "mental activity" or "mind" as being something not only radically different from but even in some vague way antagonistic to "bodily activity," or "the body." This view was not always dominant in the history of thought and is not a feature of all cultures—that of the Chinese, for example. It is not, as the author believes Piaget's work on thinking demonstrates, a spontaneous belief of little children. But we have "absorbed" it as we absorbed our language—and, in fact, partly *because* we absorbed our language. That is, the very words of our common speech have crystallized the old belief and inevitably influence us. The great artist, Plato, in his lofty dialogues dramatized the struggle between the spirit and the body; and his philosophy, with its implied despising of the flesh, is our heritage today through the avenue of mediæval Christianity. Now subjectivistic psychology does not teach asceticism, but in encouraging emphasis on the "mind" alone it tends indirectly to perpetuate a misleading popular attitude. Such an attitude is particularly unsuitable for the study of children. What is said about this incidental aspect of subjectivistic structuralism applies equally well, of course, to any subjectivistic psychology.

2. One other variety of structuralism, namely, *Watsonian behaviorism*, does not suffer from most of the foregoing limitations. It includes a study of all that people do, and regards a study of environment as very important for understanding human nature. It deals with many vitally important human problems, problems of non-rational behavior, of emotional development, of personal and vocational adjustment. This movement in psychology, related especially to earlier work by biologists, especially physiologists, arose about 1910 under the leadership of J. B. Watson¹² as a violent reaction against the narrowness of subjectivism. It had a very wholesome influence in arousing psychologists from their lethargy and challenging them to make their science really mean something to human beings.

But Watsonian behaviorism had its limitations. It was un-

¹² For a statement of Watson's position, see his *Behaviorism*, Norton, 1930.

willing to acknowledge proper debt to preceding systems, ignored many contemporary psychologists who did not have the subjectivistic bias any more than behaviorists, and tried to solve philosophical problems by ignoring them. It shut its eyes to a great body of valuable material because it was "subjective," yet was forced in dealing with many topics to include people's reports of their own activities, calling them "verbal reports" instead of by the traditional name of "introspections"¹

The main limitation of the behaviorism of Watson, however, in the author's view, was one which it shared equally with the introspectionists, and which we have not yet discussed. This was its fundamental assumption that the subject matter of psychology can best be studied by breaking it up into elementary processes and then considering the main regularities (laws) according to which these appear in larger groupings. For the subjectivists these elements were sensations and simple feelings; for Watson, reflex responses (which, it is true, could certainly be much more fully observed and measured). The subjectivist studied consciousness, Watson studied behavior. But their fundamental approach was the same. They wrote as if human development were a more or less passive matter. They gave little attention to such organizing factors in human nature as motivation. They did not see the immense importance for psychology of the personal ideals or ideas about living that begin to emerge in early childhood and come to be, for most people, the most important factors in their development as persons.

The student will notice that we have spoken only of Watsonian behaviorism. That is because there was really only one small group in this country who became disciples of Watson or who adhered to similarly extreme views. Some psychologists followed A. P. Weiss in his far more philosophical and well-thought-out theory,¹³ but this more scholarly type of behaviorism attracted little attention in the face of the popular appeal of Watson's dynamic writings. Yet the merits of the strict behaviorists' pleas for objective methods did cause many who could not accept their general theory

¹³ A. P. Weiss, *A Theoretical Basis of Human Behavior*, Adams, 1925. See also the article by Weiss, "Mechanism, Meaning, and Teleology in Behavior," *Amer. Jour. Psychol.*, 1926, 37: 450-459.

to adopt the general emphasis and to call themselves behaviorists. In so far as they emphasize objective material and study "real" problems, most American psychologists may be called behaviorists, in a broad sense of the term. But as a rule they did not come entirely into the fold; and many of those who admired the behaviorists and confessed great debt to them, were not or never had been structuralists. These may be called functionalistic behaviorists. One of those most active today is E. C. Tolman, whose views are in no sense structuralistic.¹⁴

Functionalistic Psychology. — Just as there are widely different points of view in psychology which are alike in being essentially structuralistic, so are there striking differences among the systems that the author thinks of as functionalistic. A functionalistic approach differs from a structuralistic approach first in emphasizing, if not in so many words then by implication, the fundamental importance of "wholes" rather than elements; and second in treating the various phenomena in the field in relation to other past and present phenomena which are also parts or aspects of the whole. Structuralism tends in general to be descriptive and more or less static; functionalism seeks rather to explain in the sense of discovering dynamic relationships. Plato with his eternal unchangeable ideas or meanings "laid up in heaven," may be thought of as in a certain sense a philosophical forerunner of structuralism. His thought tended toward a kind of absolutism and abstractionism, toward a neglect of the rich and tangled web of relationships in which any human event takes place. Aristotle, on the other hand, looked at the human being as a complex creature with structures nicely adapted to the functions necessary to maintain its activity, to satisfy its needs. Thus he was interested not chiefly in suprahuman ideas but in the acts and thoughts of men living in a complex and changing world: he was greatly interested in the physical and social environment.

Among contemporary psychological systems we may distinguish six different groups which share the functional interest. These are the teleological, vitalistic, and Freudian schools (which we should say stand at varying distances a little outside of the functional psychology which most psycholo-

¹⁴ See Tolman's book, *Purposive Behavior in Men and Animals*, Century, 1932.

gists consider really scientific) and the more scientifically respectable groups which the author will refer to as hormic psychology, monistic functionalism, and "whole theories" of psychology.

1. *Teleological systems*, which regard the chief adaptive acts and works of men as the expressions of conscious purpose and will, include first of all the psychology taught by Catholic schools, the psychology which regards man as a rational being able to save his soul by choice of the right. This psychology is functionalistic in an Aristotelian sense in its emphasis on the soul and on purpose. But it is Platonic also, and subjectivistic, in its insistence on the importance of divine guidance (the ideas in heaven), and on the baseness of the flesh.

Among teleological systems we may also mention the rationalistic psychology (often called mental philosophy) which prevailed in the first three-quarters of the nineteenth century before the spread of experimental psychology. This psychology, which was strongly moralistic and sometimes definitely religious in character, is no longer taught in American schools but has left its impress upon popular thought, even in educated circles. In 1881, in a popular college text, Bascom wrote, "There is a momentum in mind which prevents its movements from becoming wayward and fitful, and yet there is present a force which can slowly and certainly bend them in any direction it chooses."¹⁵ Such doctrines influenced our fathers and grandfathers directly; and many of the difficulties of beginning students of psychology today lie in their unthinking adherence to an implicit theory of human nature which they absorbed from the culture in which they grew up, a theory which credits people with far more power of rational control than modern psychology shows them actually to possess.

The author believes that the teleological approach is for the most part far too general and rationalistic to do justice to the increasingly complicated development of the mind of the child, and too moralistic to permit a realistic understanding of how children actually come to act ethically. In leading us to expect too much of children (and of grown-ups) in

¹⁵ John Bascom, *Science of Mind*, Putnam's, 1881, p. 439.

the way of insight and self-control, this rationalistic point of view favors the development of too-rigid codes of conduct and thus paves the way for undeserved self-blame and hence for disturbing mental conflicts and repressions. In so doing it may actually hinder the development of realistic and intelligent self-control in children.

2. A second type of functionalistic approach may be called *vitalism*. It is cited here merely to complete a setting for the consideration of the field of psychology. Although no scientific worker who is actually rated as a professional psychologist is willing to call himself a vitalist, still we may trace the relationship if not the influence of vitalism (a movement that arose in the field of zoölogy) on a number of psychological systems (especially the "hormic" psychology of McDougall, and certain Freudian interpretations). According to such vitalists as Driesch in biology and Bergson in philosophy, there is an animating and directing vital force or *élan vital* which in mysterious ways of its own causes animals and human beings to do the things and think the thoughts that will help them to get along on this planet. In the author's opinion we might just as well use the Catholic term *soul* as the term *élan vital*, and both concepts are too vague for helpful use in child psychology, although they may be useful for purposes of general conversation and literary treatment.

3. About the well-known *Freudian school* we need say little here. Few psychologists are willing to deal with the Freudians as fellow-psychologists because they are nearly all ignorant of the current experimental findings, as of current psychological theory. But psychologists do credit them with having presented a challenging body of clinical findings and of explanatory concepts such as that of the complex and of compensation which, explained in definite psychological terms, are of great value. Certainly Freudian materials must be studied by any student greatly interested in the "whole child," including many often neglected subconscious or unconscious effects of early childish experiences which may profoundly affect a child's mental development. Such students will for the same reason also wish to examine the work of Pierre Janet in France and of Morton Prince in America. The conceptions of Prince especially are, like those of Freud,

thoroughly dynamic and functional, and they are more acceptable to psychologists than the theories of Freud and the various neo-Freudian groups.

4. *Hormic psychology* is associated in this country with the name of one man, William McDougall, who has argued brilliantly for it in many articles and books.¹⁶ McDougall is so impressed with the marvelous adaptiveness of the activity of living things that he believes there is a kind of conscious (or subconscious) foresight and purpose (*horme*) even in the simplest activities of living organisms and even in the internal physiological adjustments of complex organisms: "Hormic activity is essentially mental activity, involving always cognition or awareness." He sees this awareness of ends, "however vague and short-ranging," even in one-celled animals, in fetal human beings, and in infants.

The author, with McDougall, sees that living things are or become marvelously adapted to both external and internal conditions, but she believes that to assume "awareness" in all adaptation does violence to the ordinary meaning of the term. Moreover to use a word in so very general a sense robs it of useful meaning. McDougall tends to explain all mental activity by the same processes (really by instincts which he believes have a conscious or cognitive aspect). In the author's opinion the assumption of such an attitude as McDougall's in child psychology would, if followed to its logical consequences, lead the psychologist mainly to expressions of wonder and admiration, not to the straight analytical thinking which is needed to guide us to the truth.

5. *Monistic functionalism*. In the United States there has developed a type of psychology which has often been called functionalism as if it were the only functionalistic psychology. It is closely related to Darwinian theory in biology. In Darwin's generation Herbert Spencer was urging that mind in the race has evolved in the process of adaptation to environment, and mental activity itself subserves the function of better adapting man to his environment. The American psychologist Dewey was impressed by this point of view, but it was William James who first among scientific psychologists explicitly rejected the atomistic conception then in

¹⁶ See the chapter on "Hormic Psychology" by McDougall in *Psychologies of 1930*, Clark Univ Press, 1930, Carl Murchison, ed

vogue. He attacked the doctrine of the "association of ideas" then prevalent in England rather than the sensationalistic school of Germany and the United States, but whether the elements be ideas or sensations the argument is essentially the same. James urged in his great *Principles* (1890) that we can not explain mind by the forms of arrangement of "elements," as one explains houses by stones and bricks. For in psychology we must take account of a *knower*, and consciousness of self is a factor in mental development. Our mental life is orderly, James believed, that is, capable of scientific analysis and understanding, but the elementaristic type of theory is far too simple to explain its rich complexity. James therefore took into account "the fact that minds inhabit environments which act on them and on which they in turn react," and in so doing helped to establish a tradition in American psychology of great importance for child psychology, a movement which seeks as one of its main aims to trace the history of this continuing process of adaptation to environment in the mental growth of the race and the child.

In his last years James finally broke with the subjectivism which in his day could hardly be escaped, and wrote in 1904: "I mean only to deny that the word (consciousness) stands for an entity, but to insist most emphatically that it does stand for a function. There is, I mean, no aboriginal stuff or quality of being, contrasted with that of which material objects are made, out of which our thoughts of them are made; but there is a function in experience which thoughts perform. . . Experience, I believe, has no such inner duplicity; and the separation of it into consciousness and content comes, not by way of subtraction, but by way of addition. . ." Thus James became a *monistic functionalist* (the author's term).¹⁷

Influenced by James and by the social and intellectual movements of the time, especially by the new conceptions in biology, American psychologists felt increasingly the limitations of sensationalism, and functionalistic views became solidly established. At Chicago Dewey in a famous article in the *Psychological Review* for 1896 attacked the neurological atomism of the time; and functionalism found its center at

¹⁷ William James, "Does Consciousness Exist?" *Four. Phil., Psychol., and Sci. Meth.*, 1904, I 477-481.

the University of Chicago. Inevitably in these early days many psychologists, especially perhaps those leaders who were trained in Germany under Wundt, were unable to escape from their subjectivistic training. Some became interactionists, that is, they maintained the essential disparateness of the mental and the physical, but held that mind or consciousness "emerged" at times and could control or direct bodily processes. This phase of functionalist thought was represented by J. R. Angell and G. H. Mead. Thus the function of consciousness (of thinking, remembering, and the like) was to adapt man the better to his environment.

This view, although far more realistic than the subjectivism which simply analyzed consciousness regardless of function, had serious logical inconsistencies. how could an immaterial timeless and spaceless "something" influence physical activity of an entirely different order? Functional psychologists began more and more to see that their ideas about the fundamental nature of human activity needed revising, and under the leadership of Carr at Chicago and others a monistic type of functionalism, directly related to the later thought of James, came to prevail among the functionalists of the United States. Human beings as we actually know them are not minds *in* bodies — they are living, acting, thinking, *persons* — organisms in constant activity, in the total stream of which it is impossible to make a rigid separation of "mental" and "physical." Thus, these functionalists believe, we can best understand human nature if we take the individual human being as a living behaving organism as our point of departure, ask what are the forces and conditions that keep it active, how it responds to the various environmental situations that confront it, and how its unity is conditioned and maintained.

This view shifts the emphasis in psychology from consciousness to situation, and considers as relevant material for psychological study any aspects of the situation (neurological, physiological, economic, religious, and the like), the study of which will help us to understand the human being who is acting. Not merely external situations (stimuli) but inner "stimuli" (involving organic needs, acquired feelings, ideas, plans, and ideals) must be considered in this effort to understand human nature. And, in this functionalist view,

all that a human being does (or thinks or says or hopes) while confronted with any of these stimulating situations must be considered as of possible importance in explaining his adaptive behavior at the time. Thus monistic functionalism utilizes both the results of introspective analysis and of purely objective study — but these methods are not used as if antagonistic. The subject-matter of psychology is neither consciousness nor behavior (in the narrow sense), but the adaptive activity of the whole human being — activity which may or may not be conscious, but which is always unified, that is, activity of an organism.

The adaptive activity of a human being is not only a more or less unified whole at any particular time or cross-section; it is also unified longitudinally, that is, whatever a human being does or thinks or feels at any one time is related to what he has done, thought, and said in the past; and, just as much, to what he will do, say, or think in the future. From the time of conception on (before conception even, when we include hereditary factors), conditions exist and things happen to the growing organism which are related to his later development; and the response of the organism, from the first movements of the cells and the early fetal activities, to the complex acts and thoughts and plans of the adolescent and the adult — all these responses (or whatever else one may call them) are themselves factors in the shaping of the adaptive activity (mental activity) that is taking place or will sometime take place.

In early childhood there is extremely rapid development and in this period the leading modes of adjustment to the world — motor, intellectual, emotional, and social — are rapidly taking form as the personality or style of life of the individual begins to stand out. Thus for the “monistic functionalist” child psychology is from the point of view of theory as well as practice, an extremely important branch of the general field. This is the point of view which the author has come to make her own, toward which she is inevitably more sympathetic than toward others, and which she will develop as consistently as possible in this book. It is important for the student to keep in mind this frame of reference, and to consult writers representing other points of view in order to

get the most just and sympathetic presentations of those ways of looking at child psychology.

6. *Whole psychologies*. At the same time that the psychology which has come to be called simply "functionalism" was developing in the United States (along with a functionalistic biology) as a reaction against elementaristic views, an essentially functionalistic movement was for somewhat similar reasons developing in Germany, the home of the sensationistic structuralism known as Wundtianism. In Germany, there arose a number of schools which agreed in rejecting, as James had, any explanation of mental life as a sum of elements. These schools logically belong together but in true German fashion have each insisted on their unique differences from the rest. We shall describe two, the personalistic psychology of William Stern, and *Gestalt* psychology.

Stern describes his "personalistic" psychology thus: "At the center of its consideration stands the concept of the 'person,' which is defined as follows: The person is an individual, unique whole whose activity is goal directed, who is related to the self, is open to the world, and who lives and experiences. . . . The person as such stands beyond the distinction of physical and psychical. . . . Experiencing or consciousness is only a sector of the quality of the person; it is that sector with which psychology is concerned."¹⁸

With such a point of view it is clear that Stern would be particularly interested in child psychology, and it is no academic accident that he was the first leading psychologist consistently to carry on significant research in the field. The last part of the quotation shows that Stern, though avowing a monistic point of view, was still much influenced by the dominant German subjectivism. Partly for this reason, partly because some of his theory seems too vague to be the most useful tool for study (and partly because she studied at Chicago), the author prefers the American brand of functionalism.

The same sort of statement can be made about the more recent German whole psychology, *Gestalt*. Because the soil was prepared for it, a lively functionalistic movement having

¹⁸ William Stern, "On the Nature and Structure of Character," *Character and Personality*, 1935, 3 270-271.

long existed in this country, and psychologists having become increasingly dissatisfied with both main types of structuralism, *Gestalt* found a hearty welcome here. It is related in many ways, especially in its rejection of elements and its belief in the unity of the mental and the physical, to our native American monistic functionalism, or as it is now often called "organismic psychology." But it differs from the latter in retaining a characteristically German subjective slant, in using much more general terms (because of its stiff-necked opposition to analysis), and in limiting its interest pretty narrowly to certain parts of the psychological field, in particular to perception. It is a "whole psychology" but it refuses to deal with the whole of psychology or, as yet, with the whole human being or "mind in the midst of all its concrete relations," to quote again the *Principles*. Wholesome as the influence of *Gestalt* has been in this country, and much as the author approves of its general aims, she finds its usefulness as a tool for understanding child psychology limited by the vagueness of its terminology and by the narrowness of its actual accomplishments.

This sketch of leading theoretical approaches to the field of child psychology is of course brief and inadequate. It is intended not as a final characterization of the views discussed, but only as a means of furnishing a preliminary orientation in theory which may stimulate the student to that organization of his own point of view which the author believes is so important. In working out his own point of view the student should remain critical of the point of view of the text, while trying sincerely to give it due consideration. The author hopes that in the end he will come out with some thoughtful view of his own, and not with an unorganized jumble of facts and theories from different sources. For it is not with such an equipment that we can most effectively pursue the truth that is so sorely needed.

SUGGESTIONS FOR READING

The student will profit by reading books in the field of child psychology which represent different leading points of view. A general systematic treatment which reflects a subjectivistic point of view is Carl Bühler's *Mental Development of the Child*, and in this book, although it clearly shows the influence of Wundt, the subjectivism is much diluted. Even though a psychologist's conception of psychology is subjectivistic, he must use or discuss objective methods. This is true of Milicent Shinn's *Biography of a Baby*, referred to in this chapter. Subjectivistic in point of view, this book is largely a concrete and delightful report of *behavior*. . . Objective structuralism is represented in various books by John B. Watson, who has the gift of writing in a very stimulating and provocative way. Watson's *Psychological Care of Infant and Child* was not long ago very popular. It is dogmatic and simplifies too much the problems in the field, but is well worth reading. Anna Freud's little book, *Psychoanalysis for Parents and Teachers*, is a simplified presentation of the Freudian point of view. . . In William Stern's *Psychology of Early Childhood* the student will find a very readable account from the point of view of personalistic whole psychology. This book is enriched by frequent quotation from the diaries of their children kept by Professor Stern and his wife. . . *Gestalt* psychology is represented by Kurt Koffka's *Growth of the Mind*, which is rather hard reading for the student without a pretty good psychological background. A modification of the *gestalt* point of view is the article by Kurt Lewin on "Environmental Forces," Chapter Three of the 1931 edition of the *Handbook of Child Psychology*. This presents a "field theory" based like much *gestalt* theory on physical analogies. . . The present book presents systematically an American functionalistic position. . . Two large books are specially recommended for reference. One is *The Child in America*, by W. I. and Dorothy Thomas, which presents a thorough and valuable survey of methods and results up to the time of writing. The other is the *Handbook of Child Psychology*, which presents scholarly articles by various authors dealing with leading topics in child psychology. A good reference book for the student is F. D. Brooks' *Child Psychology* (1937), which is almost encyclopedic in its thoroughness in citing factual studies. Another excellent book for reference is Stoddard and Wellman's *Child Psychology* (1934).

CHAPTER II

ANN'S FIRST FIVE YEARS

CHILD psychology as a science involves primarily the attempt to gain a useful and hence an analytical understanding of the chief problems of mind and its development through childhood. As a basis for a wise understanding, however, an imaginative grasp of what the growth of a real child is like is essential.

The best way to acquire a concrete picture of the process of behavior development in a child would be to observe daily the activities of a particular child. The student who cannot watch a growing child while studying child psychology should by all means acquire vicarious experience by reading such first-hand accounts as he can. We shall be able to help the student imagine how a real child grows in the first years, by presenting in this chapter a condensed account taken from a diary record made by a psychologically trained mother, using the Anderson and Goodenough "baby book," *Your Child Year by Year*. The little girl, Ann, was known to the author during the entire period described.

In order to help the student gain a realistic and imaginative grasp of how Ann really grew, we shall do a minimum of editing of this account, presenting most of the weeks' accounts just as they were written down at the time, and giving some attention to the reactions of the family as well as those of the child.

As we become interested in the development of a particular child, we find such expressions as unified organism, maturation, differential growth, and negativism taking on a rich and concrete meaning, seeing how useful they are in explaining what the child says and does. We also find ourselves wondering how the child happens to be saying this sort of thing and not that, what he will be able to do in school, what he will be like when grown up. And if we begin the observation of a child with a certain background of psychological knowledge, such as a reader of this book already has, we see as we watch that in order to answer all such questions, which

are important for the psychologist as well as for the parent, we must know many things not taught in general psychology, and use methods of study different from those most common in the elementary course.

A study of a particular child in all his lively and fascinating complexity, or even a second-hand study through reading, should also convince the student that, although it is the whole child that we want to understand, we cannot get such understanding by studying the whole child all at once and all the time. For the sake of convenience and effectiveness in reaching serviceable solutions of the problems in the field it is necessary to deal with the material under separate topics and to isolate particular phases of larger problems for special study.

From the first Ann, a healthy six-pounder of a light pink color with soft light fuzz for hair, was known as a "good baby." She moved a good deal, on that first day, squirming, turning her head in a vague wobbly way, and keeping trunk, arms, and legs in rather aimless motion. "Nursed from the start (age 12 hours) well and vigorously — made a sort of dive at the breast" when head was guided in the proper direction. "Fixates center light in room while held by nurse. Eyes shut and open together — no marked lack of coördination. Strong grasp of finger. Much general bodily movement."

Second week: "Relaxed contented expression when held after nursing. 'Eager' movement before nursing, eyes moving a good deal. 'Searches' eagerly for nipple when in contact with breast; if not, just as likely to turn toward nurse as mother . . . good hearty cry occasionally, when has to wait a second for nipple."

Ann's eager nuzzling for food, her sudden protesting cries when changed from one breast to the other, and her blissful expression after nursing, were all enjoyed by the nurses as well as by the parents. She was like a funny little puppy. But she showed real advance in behavior, as in weight, during the first two weeks. At first she lay supinely wherever placed, but at the beginning of the third week she was pushing with her feet when they encountered resistance (the beginning of a response important in walking). And when laid stomach-down against a grown-up's shoulder, she

lifted her head up in a definite vigorous way as if to "look around." During this third week the nurse, after picking her up, called attention to a "very broad smile all over her face." Was this "a true smile," or "just a reflex"? That depends on your point of view in psychology. It certainly occurred in a child who had no colic, and it brought joy to the beholders!

Fourth week: . . . "When she is held, talking alone, without caressing, produces jolly grin, lips and eyes forming half-moons. Smile sometimes quite crooked! Cooing at such times is first noticed this week. Follows with eyes and head the face of a person talking and moving in room. Enjoys bath greatly, kicking and making little sounds."

During these early weeks Ann maintained her reputation for "goodness," and her unusually pervasive and merry smile occurred more and more often, greatly impressing visitors. In the sixth week when she was talked to in the entertaining way employed by experienced grown-ups, she not only smiled but often "laughed aloud," a joyous funny little shout. A "mere reflex" again? Well, the author would say, a reflex perhaps, but not a "mere" reflex.

The main question in the mind of the whole family by the time Ann was three months old was this: Does this baby — this person they almost said — really have an unusually sunny disposition? Will she be as happy at the age of five years and at fifteen? Family and friends also wondered at this early age if Ann was not going to be a sociable youngster. From the fifth week she had smiled and chuckled at other people's talk. Now she smiled as her mother approached her crib without talking. She smiled at strangers as she did at relatives. At this time she was showing intense interest in people's faces. She "even stops nursing to look at a person near — seems fascinated, especially when people talk. Often smiles."

In this responsive behavior of Ann's, in her contentment and frequent smiling at others, we have what seemed to the family to be an unusually favorable basis for outreaching social behavior later. The interest in mobile faces Ann shares, however, with all normal babies.

Ann's disposition, though happy, was not, at three months, acquiescent and syrupy. She cried vigorously when tempo-

rarily taken from breast or bottle. In the twelfth week her mother had seen the first real tear, in her right eye. At three months she sometimes whimpered when a grown-up left her. She showed mild fear responses, starting at the sudden opening of a door, and sometimes crying when there was a loud sound.

Notes for the week ending when Ann was just three months old say: "Grasped rattle by middle of handle when put in her hand, shook it, paused, shook again. Kept it in hand, shaking it off and on, for twenty minutes by clock. Heard from other room. Must have dropped and got hold of it again, for when seen after ten minutes, had it now by the ring. Seen to watch rattle as she shook. Repeated other days — not tried often. Did not shake so long."

"Holds top of blanket by edge with both hands, pulling up and down. . . Caught hold of Mrs. B.'s sleeve while latter changed her, and cried sharply as Mrs. B. loosened her grasp. . . Pulled self up by putting hands in back of dressing table. Said ah-ah-ah few times and *seems* to repeat. First babbling. 'Talks' to self. . . Pushed self up in crib at least six inches, kicking pad and covers away."

These records indicate what a marvelous development this baby, twelve months ago a single microscopic cell, has undergone. Weighing six pounds at birth, she now weighs eleven, having gained half a pound in weight each week after the brief post-natal recession in weight. No longer supine and nearly passive, as she was just after birth, she tries to move about from where she is, sits up when supported, actively explores objects about her with her hands, and looks at things and people with eager curiosity. In the first weeks it was impossible to single out definite speech sounds aside from the sometimes wailing and always nasal "ä(n-n)." Now the family notices clearer articulation, with a good hearty "ä" and a clear-cut "ah" which she shows a tendency to repeat. All their efforts to "teach" her new sounds have failed — she practices only her own slender spontaneous repertoire — but they can see that she is making progress in "talking." With their minds on the future, her charmed relatives firmly believe that she is a bright child, and that she already has a distinct personality.

From now on Ann grows so fast and develops new ways

of acting so rapidly that her mother can hardly keep pace with her but lists the main events in the biography, from which we can now quote only sparingly in an effort to give a general picture of how this little girl grew.

Twentieth week: "Tried to put my finger in her mouth. When prone, struggles and shoves with knees and feet as if trying to creep, keeping up efforts for say fifteen minutes, until position changed — gets red in face and even starts to cry finally — may rest a little with head on side, but soon resumes — has moved forward only a few inches, however — doesn't get feet low enough. Continues to watch hands; and this week shows great increase of interest in things in room, leaves moving outside, etc. Looks with great alertness all about her, and often fixates one thing as if fascinated. Has begun to put hands on knees, palm down, one or both at a time."

Here we have an illustration of the sort of physiological urge which is going to dominate her activity at times until easy locomotion is attained. More and more Ann is herself acting, not just being acted upon.

Twenty-sixth week: "Cried at sound of thunder. . . Listens when she hears footsteps on stairs. Turns and looks for person coming up."

In this week, when Ann is six months old, comes a development fraught with dramatic significance, in the opinion of the psychological mother. Is this smiling little animal already thinking? Her turning toward the stairs and waiting might be a mere set of conditioned responses — but it looks like the dawn of ideas. We shall watch closely for further evidence on this point. Ann is certainly far more complex mentally than she was three months ago. The persistence of her merry disposition is evidenced by her picture (See Fig. 1), but she now has also a lively and agile curiosity, like most babies of her age — she is all ready to think, if she has not actually begun to use genuine symbols.

Thirtieth week: "Marked desire to sit up — strains till red in the face when prone, and someone talks to her or reaches out hand. She *pulls self* up, bending elbows. Smiles delightedly when sung to. Very content and happy baby. Looks around eagerly in strange room. Pounds bottle with hand — pounds hand on table — turns and twists body to

reach things." *Thirty-fourth week*: "Says da-da-da-da . . . also ada, da, ada . . . bvũ or bū, mui, ng, and various strange sounds hard to get. Talks softly to self when contented, 'sputters' emphatically at other times. Sits up alone for few seconds but soon falls over. Left alone on floor, gets some



FIG. 1. ANN AT FIVE AND THREE-FOURTHS MONTHS

distance away — turns on stomach as pivot, rolls, and pushes self backward with feet."

In the thirty-fourth week we find that "dă," first "said" ten weeks ago, is now repeated over and over again, as are some more recent sounds. The importance of this babbling in the development of speech we shall discuss in another chapter.

Forty-first week: "Very curious about surroundings, especially new ones. While on chair fingered small hook on wall, pulled laundry bag near by. Continues to pull curtains near bed. Stares at our faces for some time as if to try to understand us. Shows increasing delight at pounding top of

table; and leaves off feeding to do so if we allow her. 'Begs' to be bounced in our laps by starting motion and looking up at us. Occasionally cries heartily if someone who has been playing with her puts her down — must be careful about spoiling. Has begun to throw things to floor 'for fun,' and if handed to her throws them down at once. Raises self easily to sitting position now. Sits up 'all the time.' "

This final triumph of raising herself to a sitting position marks the end of a long period of intense striving, which began in the twenty-seventh week when Ann first kept hold of a grown-up's hand until she was sitting partly up in her crib. From now on things move rapidly. She babbles more and more, and plays peek-a-boo. But Ann's dominant interest seems to be in moving from one position to another. She keeps trying to pull herself up by the rail of her pen, and finally in her forty-fourth week, when ten months old, after efforts which make her grow red and even cry, she succeeds in raising herself to a standing position and stands by the rail, a broad smile on her tear-stained face.

The next developments are the perfection of creeping, begun weeks before, and the slow development of walking. These next weeks are so eventful that we must quote more fully than usual.

Forty-fifth week: "Marked desire to stand up, tends to cry when set down in pen. Habitual position in crib is on knees. Found standing (having raised self alone several times this week. . . Bounces on feet delightedly and sways body, holding to rail, when standing." Then comes news of activity bringing special joy to the beholders — "Plays peek-a-boo in bath — *pulls towel up* over face and lets it fall or pulls it down. End of week offered bread to Mary — plainly tried to put it in her mouth. Also in mine. *Tries to creep*. Emphatic vocalization, more inflection."

Forty-sixth week: "Put cereal spoon in *my* mouth — also in hers — 'Knows where it goes!' Plays peek-a-boo, putting cloth up over head, pulls it down, laughing; also laughs loudly when it is put up by someone else, and she pulls it down. Tried to give her lesson in feeding self cereal with spoon — in bathtub. After one or two attempts to put it in mouth, she merely played and banged spoon."

Forty-seventh week: "On Sunday, saw her for the first

time definitely creep, on hands and knees, regular coördinated movements, but only about four feet, then dropped to stomach. Repeated several times when coaxed with shining ring as lure. New tooth same day. Weight Sunday 21 pounds, 11 ounces. Tries to walk along pen, holding to rail, but has to use both hands so goes slowly. Plainly imitates us often, when we say 'ä(n),' etc. Imitates sister's shaking of head 'no-no.' By end of week is creeping, patting hands on floor as she goes."

For some time grown-ups had played peek-a-boo for Ann, managing the cloth themselves. Now she plays the game herself. Surely this means *thought* on the part of the baby. Her offering of food to her friend, and her putting of the cereal spoon in her *mother's* mouth, are corroborating incidents. Members of the family take increasing delight now in her spontaneous play with them. *She* begins things, *she* makes suggestions, though not in words. Pad-padding merrily about the house, she is a real person seeking ends of her own. The bonds of family affection grow in strength.

Now that Ann can easily get from place to place, stand up easily, and even walk about by furniture (this latter a development of the forty-ninth week), she no longer practices these activities so much, or betrays the strained efforts once involved. Instead new activities come to the fore for a while. The chief of these new activities is talking. Between the thirty-fourth week when babbling first became prominent, and the forty-third week, there has been a good deal of babbling, a new syllable spontaneously appearing from time to time and being "the fashion" with Ann for a while. Among these have been, besides *ä* and *dä*, *ada*, *bvu*, *mm*, *um*, *ma*, *na*, *aug*, and *bu*. In spite of persistent coaching she has not said *mama*, with just two syllables, but after the forty-third week this word, distinctly pronounced, occurs often. In the forty-seventh and following weeks she clearly repeats "words" after the parents, but only those like "her own," and these she distorts. At one year she says *Mama*, *Pahbah* (*Polly*), and two other names of people, but the parents do not record these as words, because they are not sure that they are consistently applied to the proper people. During the thirteenth month, however, these are used with perfect consistency — Ann has really begun to talk!

Fourteenth month: "Marked development of speech sounds and of vocabulary. . . 'Talks' to herself and to others as if speaking, with inflection and tones changing. Says playfully 'good-a-good-a-good-a-good . . . ' very fast. After one or two practice times learns new words or little tricks. When asked 'What does the doggie say?', says 'bu-bu-bu!' expressively. Heaves deep sighs when we do, purses lips and expels breath to imitate our whistling, but doesn't make sound. Delights to play peek-a-boo with dress or any piece of cloth she can get hold of. When asked 'Show me your foot, shoe, or ears' takes hold of proper place. Waves bye bye (and sometimes makes kissing sound) spontaneously when about to be carried out. When told 'Pat the doggie,' pats toy dog, also a person who is near, laughing. 'Pat-a-cakes' awkwardly when told to. Stops what she's doing when told 'no-no.'" At the end of this month Ann has a vocabulary of thirteen words spontaneously and consistently used of particular objects or in particular situations.

From now on Ann learns new words rapidly, and by the seventeenth month is using simple phrases and even longer combinations of words. Meanwhile the most important final stage in the development of erect locomotion is reached, the culmination of a long period of active development that began in the first weeks with the occurrence of alternate stepping movements and the vigorous pushing of the feet against obstacles. We shall quote most of the diary records for the sixteenth, seventeenth, and eighteenth months, in an effort to give a concrete idea of the variety and complexity of this little girl's activities and interests.

Sixteenth month: "Began to stand alone more and more confidently, for longer periods, and encouraged by us, tries hard to walk but always falls to floor (drops), laughing. Finally on Sunday she took her first undoubted real steps — nine of them — very slowly and awkwardly, part of them sidewise. *Delighted!* Said 'go bälk' Monday as she spontaneously started to, by furniture. April 16, I saw her in her pen, clasping velvet doggie to her breast, swaying and singing 'ah, ah, ah!' (Friend had yesterday shown her this trick.) Friend taught her to say 'Mama!' when asked 'You love—?' Soon got habit of clasping doll and singing 'Ah, ah, ba-by!', also of cuddling in lap of person and singing

same. Wishes much stronger — says 'come on' and cries or gets red if not taken. Walks faster, longer steps, pounds feet on floor, but won't go *alone* except few steps. Loves to 'go walkie.' Climbs."

Seventeenth month: "Raised self from floor climbing up shelves of Daddy's book-case. Climbs up on couch alone. First of the month began to sit on little chair — persistent, awkward, missing often, delighted at final success. On the twelfth, held own cup and drank alone for first time. Frequently after that. Pulls at people to take her walking. By middle of month had kept dry all night four nights out of ten. She is now using a few simple phrases—'come on,' 'come-mama — bye bye.' Unties shoes, reaching for *ends* of strings. Stands on upper porch and by study window saying 'hello' or 'hä-da-do' to people seen — or at place where had seen them. May 28 said 'ball' when spoon rolled toward her."

Eighteenth month: "Increased ability to climb on and off couch, chairs, etc. Tries to climb up side of porch by railing. Won't step down the shallow step to the porch, but says 'ge down!' and begs, whining, till someone lets her down. . . Very marked progress in talking, using many simple sentences at proper times—'Bunny walkie!,' 'Come here!,' 'Hädado, bunny!' (shaking paw), 'Goo-by, daddo!,' 'Hello, Mama!,' 'Go walkie, bow wow,' etc. ('Peek-a-boo, birdie!') General use of words. She applies 'muk' to milk, also to all cups, glasses, pitchers. Complex associations—she hears car stop outside, and runs to window calling 'Pank!'—(Frank often comes in car). Has a little joke — pinches self, or others, then says 'outs!' (ouch), laughing. Goes to cupboard in kitchen, saying 'cacka!' usually gets cracker there. Understands how lights are turned on, tries to put end of cord in plug in base board, saying 'light.' Brought dress to me to put on her. Goes through motions of sweeping, ironing, etc. Plays happily in sandbox, filling and emptying cans and boxes. Arranges clothespins in rows around top of tin can. Delights in filling pan with toys. Very friendly, calling out to 'Mama,' 'Gamma,' etc., from play pen."

At eighteen months it is clear that this little girl, having undergone a perfectly normal development, has acquired all the basic ways of acting that adults employ, including

the use of speech. Her parents see her also as a real person, with her own special tricks of expression, ways of doing things, and general disposition. Nature has certainly laid down the pattern of her life, in the sense that she now exhibits all those distinctively human characteristics which are often called instincts. What individual variations will later become evident, how her "personality" will grow—these are different questions. Ann's record is complete through the fifth year, hence we can indicate the nature of the developments of the next four years, giving merely a summary for each year.

At two years Ann is still in excellent health, rosy-cheeked, very active and happy. Her rate of general bodily growth is slowing down steadily, but she gains in weight regularly and keeps well ahead of the average child in that respect as she does in height. She can now walk upstairs entirely without help, ride a kiddie-kar, climb into a swing and swing, turn a knob to open a door, use a child's broom, and carry her furniture from place to place. In all these activities we see no new reflex or instinctive activities, as we did earlier—those already acquired are being perfected and adapted to new situations.

In her ability to talk and to solve problems Ann has made marked progress. She gives her full name in answer to questions, understands instructions well (e.g., will bring things to people or close doors on request), remembers where to look for things, and shows originality in solving mechanical problems. She refers to herself consistently as Baby. She has a conscience—tells herself "No-no" when starting to do something forbidden, and refrains. She also says "No" firmly when requested to do something she does not care to do. She names objects in pictures spontaneously; and shows warm recognition of friends provided they have not been away too long. At the age of two-and-a-half she failed to recognize, after four weeks, two beloved members of the family who had been away on a vacation.

Ann is still exceptionally good-natured, has no persistent fears, and is very friendly with other children. With strange grown-ups she is usually shy. She cries at times when there is a loud noise—loud laughter, for example. She herself

laughs heartily and often, highly amused at the antics of playful adults, or joyous in her own play.

It is recorded that Ann cannot carry a tune, but she tries to sing and whistle, and pays rapt and delighted attention to music. She loves to have others "dance with her" to music. No other special interests are recorded.

At three years Ann's health is only "good," since meanwhile she has had a long siege of whooping cough. She walks, climbs, and goes down slides confidently, and prefers to go upstairs one foot on a step at a time. She is a fearless child, and according to teachers at nursery school, which she has attended for three months, is well balanced emotionally. She winces but does not cry when iodine is put on a cut. She is still shy with grown-up strangers, and was said to be unusually shy, at first, in nursery school. By this time the shyness has worn off and she is talkative, active, and cheerful.

A marked feature of Ann's play at home is the earnest make-believe play she carries on, in the course of which she assumes different rôles, being in turn Big Sister, Mommy, Daddy, Spotty the dog, or Goldilocks. Sometimes she keeps up such a play for a whole day, insisting on being addressed by the proper name.

Ann now takes great pride in dressing herself without help, insisting on fastening each button herself. (At two she did only a few things, such as putting on stockings and lacing shoes.)

No new special interests are recorded, except for increased interest in looking at picture books.

At four years Ann's health is not yet robust. But she is normally active, and enjoys life thoroughly. She now does some new things, no doubt partly because of increased physical development and only partly because of practice. She rides a tricycle, taps her foot to music, turns a somersault, and pours water without spilling.

Her vocabulary has grown apace. On request she gives her name and address — state, city, street, and number — and easily repeats a sentence of eight words. She correctly counts objects up to nine, but not higher. She uses long sentences, such as "Will you stay my stockings off (let me leave them off) 'cause I'm goin' outdoors an' go barefoot, 'cause

you said I could?" She continually asks what things mean, using rather long words in doing so, and speaking slowly and distinctly. Example, "What does con-ven-tion mean?"

Emotionally Ann is still well balanced, but she may at times cry and stamp her feet when other children refuse to follow her directions. She is becoming more aggressive and likes to lead. She is often shy when meeting strangers. She is very affectionate to members of her family, doing many thoughtful little things for them, such as bringing a glass of water, or picking up something that has been dropped.

Ann now, at four years, displays a new ability. She can at last carry a tune, singing quite accurately several nursery songs. Another new thing is the production of many named drawings instead of mere scribbles. Many of these are recognizable without naming by her. She has also in this year taken increased interest in colors.

At five years Ann has grown normally but is still not robust. She "works" eagerly outdoors, digging, pounding nails, and playing house. She rides a pony eagerly and well when permitted. She has good coördination, her teachers say, and learns new skills readily. She cuts out pictures with great care, cutting carefully along a small pattern. (The smaller muscles are being used more now.) She is very neat, hanging up her clothes and keeping her things in order. She scorns help in dressing, unless there are back buttons, or a double bowknot to be tied.

Her intellectual development during this year has been marked — an endless source of delight to the family. She repeats many poems from memory, gives lively accounts of her own doings while away from home, shows great interest in numbers and remembers them, keeps her promises, and shows originality in dealing with practical situations. She knows what makes boats go (a motor in the front), how chickens are hatched, and how butter is made. She readily repeats a sentence of twelve words. She spontaneously learns to print many letters, and recognizes all the letters and a few common words. She asks endless questions. Her parents do not take the trouble to find out what her I.Q. is, and so they do not know just how she compares with other children in such performances. In this they are wise, in the author's opinion.

Ann's personality grows more complex. Shy at first with strangers, she soon becomes friendly, and is gay, active, and coöperative. She often takes the lead in play with other children but will follow others also, at times. She has strong interests and will play alone at some project for long periods of time. Her anger is not often aroused but she sometimes bursts into very loud talking and scolding when people do not pay attention to her talking.

Ann's interests are now more marked and varied. She sings a great deal, carrying the tunes accurately. On her fifth birthday the family wrote down the names of many songs she was singing from memory (at least one stanza). These included "O Come, All Ye Faithful" and "Good Morning, Merry Sunshine!" She makes many drawings, and shows marked interest in choosing pretty color combinations. She takes a special interest in tools and machinery, using her toy washing machine, for example, with absorbed interest. She knows how electric lights work and what makes trains go. She is interested in everything under the sun, and is beginning to think and talk about the world, dreams, ships, mountains, and rivers — and the sun and moon and stars — and living and dying. She has never ridden on a railway train, and keeps begging her parents to let her go on one. She wants to be a "cooker" (cook) when she grows up, or else a locomotive engineer!

During Ann's first eighteen months new developments succeeded one another rapidly. "See what she's doing now!" was a common remark in the family, and no one watching these developments could doubt that they were intimately related to the rapid physical growth she was undergoing. But after she started walking such new ways of acting ceased to appear: instead there was modification and perfection of the already established ways. Ann ceased to toddle after a few months, and began to walk with feet close together like an adult. She became more sure and definite in all her movements. She was definitely right-handed by the end of the second year, and used her hands more and more skillfully. It seemed reasonable to suppose that Nature still had a hand in these changes, but clearly the pace of physical development was slowing down.

Watching Ann's growth one wonders if it is not true that

in the first two years Nature lays down, as it were, the whole pattern of the child's life, and leaves it largely to experience to fill in and enrich that pattern. During the rest of the growth period there will be varied and fascinating developments, of course, but in them shall we see so plainly the hand of Nature as we do in the first years, except perhaps in that last acceleration of growth at the time of puberty, which leaves the child an adult?

When we observe the rapid motor developments of early babyhood, and see them merge into ever more complex and more effective patterns of adjustment, we may wonder to what extent these developments are influenced by external environment and the special experiences of the child. Would reaching and creeping and walking develop just the same even if the parents withheld the "teaching" they usually give? Are they perhaps only a continuation of natively determined prenatal growth processes? In answering such questions a general knowledge of the process and conditions of prenatal growth would plainly be very helpful.

We wonder, also, in thinking of Ann's varied interests and abilities, of her quick little mind, to what extent these are conditioned by physical heredity, and to what extent by the excellent physical and social conditions under which she grew from babyhood. Plainly some understanding of the mechanisms and laws of heredity and of the relative rôle of heredity and environment in mental growth is essential in a scientific study of child psychology. In this book we shall devote one chapter to a consideration of prenatal growth, and several more to the rôle of heredity and environment in the development of overt activities, in emotional responses and motives, and in the growth of particular mental abilities and of general intelligence.

A consideration of Ann's first five years also opens up all the other chief problems of mental development — of learning and thinking and imagining, of social and ethical behavior, and of personality. In fact, by the age of two years Ann had acquired all the basic modes of response that adults employ, including the use of speech; and by the age of five she was definitely a person, with interests and activities so rich and varied that the family had little thought of appealing to "instinct" and "growth" to explain them. In this book we

shall try to indicate what modern psychology has contributed to the explanation of these complex mental developments in normal children.

SUGGESTIONS FOR READING

Any of the biographies cited in Chapter I are valuable sources. Some of the earliest baby biographies are of great interest, particularly Mrs. Langer's translation of "Tiedemann's Observations on the Development of the Mental Functions of Children," cited in a footnote in Chapter I. Miss Shinn's charming *Biography of a Baby* has already been recommended. If one reads German, Bubi's *Erste Kindheit* (1907) and *Vier Lebensjahre Bubi* (1935) by E. and G. Scupin, will be found rewarding. *A Practical Psychology of Babyhood* by Jessie C. Fenton, contains a biography of one baby in a setting of practical psychological interpretations and advice. . . . Finally the author would recommend to anyone who has opportunity to watch a child grow up from babyhood Anderson and Goodenough's *Your Child Year by Year*, which has blanks for recording the chief developments in the child's life up to sixteen, and definite directions for observing and recording. It has not space, in spite of its 371 pages, for a thorough scholarly account, but for parents of ordinary education it is quite adequate and is likely to stimulate them to continue a fascinating study of their child.

CHAPTER III

HEREDITY AND ENVIRONMENT IN PRENATAL AND NEONATAL GROWTH

AFTER conception there begins that complicated, orderly, and very rapid growth of the organism which continues without break until the child is grown up and the foundations are more or less completely laid for his life as a mature individual. From the functional point of view it would be a mistake to leave out of consideration any leading aspect of this growth, or any one period in the history of the personality. We might consider that there are four main periods of development in a person's life: (1) the germinal period, from the formation of the maternal and paternal cells in the bodies of the two parents, up to the time of conception; (2) the prenatal period, including the cellular and embryonic periods from conception to the end of the second prenatal month, as well as the fetal period from that time until birth; (3) the natal and neonatal periods, including birth and the first two weeks; and (4) the postnatal period, covering the rest of the person's life. We shall give consideration to all of these periods (dealing with the postnatal period only up to adulthood), but since the development of the organism is continuous and unified we shall not treat them in a formal way, and not even always in chronological order.

The first three periods, although exceedingly important, in the author's opinion, for understanding child psychology, find their chief significance in that during these periods the physical foundations, as it were, are laid down, and the basic physiological equipment which the child gets from his ancestors and indirectly from society is acquired. As students of psychology we are not interested in these physiological foundations as such, but only because they underlie and condition the whole subsequent course of mental development. The beginnings of mental growth, of adaptive behavior of the whole organism, are discernible in the prenatal period, but the complex developments after birth are those of most in-

terest to the psychologist, and these will be our chief concern in this book.

ORIGIN OF THE INDIVIDUAL AND OUTLINE OF PRENATAL STRUCTURAL GROWTH

Biological research of the last twenty-five years has resulted in discoveries which are not only of great interest but of profound importance for understanding and dealing with the development of human beings, and the student must know a few basic facts about heredity and growth in order to read intelligently of these fascinating advances in scientific knowledge. The fertilized egg which later becomes a child is a fusion of parental cells which have had a long history, but for the sake of convenience and clearness we shall begin our brief sketch of early development with the process of fertilization.

Each of the parent cells contains in its nucleus minute threadlike bodies, the chromosomes, which experimental studies have shown to be of crucial importance in transmitting hereditary factors in development. It has been demonstrated that the chromosomes contain a very large number of still smaller units, the genes. After the act of sexual intercourse one of the many male germ cells or spermatozoa which have been set free in the body of the female may unite with one of the egg cells. As soon as the tiny sperm cell, thousands of times smaller than the egg, has penetrated it there begin very complex but orderly and definite changes. The process has been carefully and systematically observed under the microscope for many animals, and we have every reason to believe that the same series of changes occur when the human egg cell is fertilized.

The most striking and significant thing about fertilization is the systematic way in which the chromosomes of the two germ cells unite. During fertilization the material of each chromosome from both nuclei splits lengthwise, and the "half-chromosomes" thus formed "migrate" in such a way that when two new cells are formed, each of them has received half its chromosomes from the father (through one of the numerous spermatozoa) and half from the mother (through one of the many egg cells she carries in her body.)

Figure 2 shows how this distribution takes place, and suggests how the two new cells are formed. Each of these two cells (as well as all the cells formed from them by later divisions), has the same kind of chromosomes. Genetically they are identical, and if as sometimes happens, each of the two cells develops into a child, identical twins are produced.

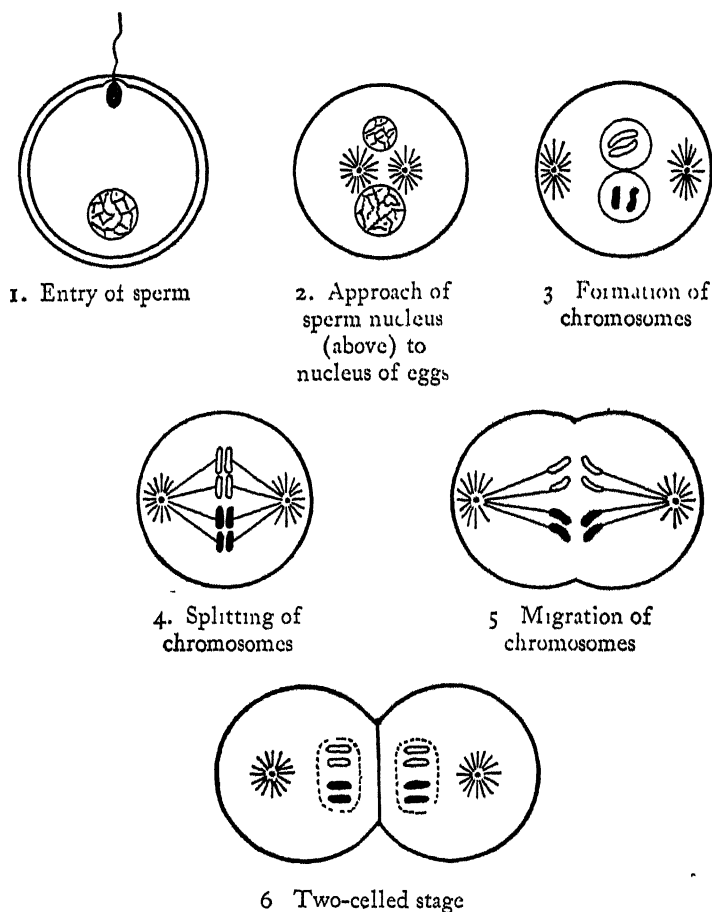


FIG. 2. THE MECHANISM OF FERTILIZATION

In this diagram it is assumed that four is the number of chromosomes characteristic of the species, although 48 is the actual number. Paternal chromosomes are represented as black, maternal chromosomes as white. (From H. E. Walter, *Genetics*. Reprinted by permission of the Macmillan Company, publishers)

This process of division and distribution of chromosomes goes on until maturity, so that every cell of the new organism has the same equipment of chromosomes.

In just the same way that the original fertilized egg divided into two cells, so now each of those two divides, then each of the four divides again, and so on, the regular distribution of the chromosomes occurring at each division. As these divisions take place the new cells cohere in a loose mass which grows rapidly in size and complexity. Soon the cells become differentiated, and certain of them are observed to contain particular kinds of substances. Different layers or groups of cells begin to form, from which develop the thick outer coat or chorion, and within it the embryo, surrounded as it grows by a fluid. The embryo becomes separated from surrounding cells except at one place, where there is left a stalk which becomes the umbilical cord. The cord becomes attached to the uterus by villi or vascular finger-like processes which penetrate into the wall of the uterus but which have no anatomical connection with it. Figure 3 is a generalized diagram showing the general position of the embryo and the mode of attachment to the uterus. Now both the inner wall of the uterus and the villi from the embryo are supplied with many blood vessels, and since the two are in close functional contact the embryo readily takes in from the blood of the mother oxygen and nutritive materials.

The embryo, now an organism of some complexity, is still physically separate from the mother. From the maternal intrauterine environment the embryo gets the nourishment necessary for growth, but as E. G. Conklin says in his book, *Heredity and Environment*, "not a strand of protoplasm, not a nerve fibre, not a blood vessel passes over from the mother to the embryo." She is merely its nurse, feeding it and protecting it until it is large and strong enough to live outside her body. There is thus no way in which the mental experiences of the mother can mark the child. There is no anatomical basis for a belief in the age-old theory of "prenatal influence."

After the attachment of the embryo to the uterus the layers of differentiated cells into which it has become divided begin rapidly to develop into the various organs of the body. Gradually and at different times the various tissues and

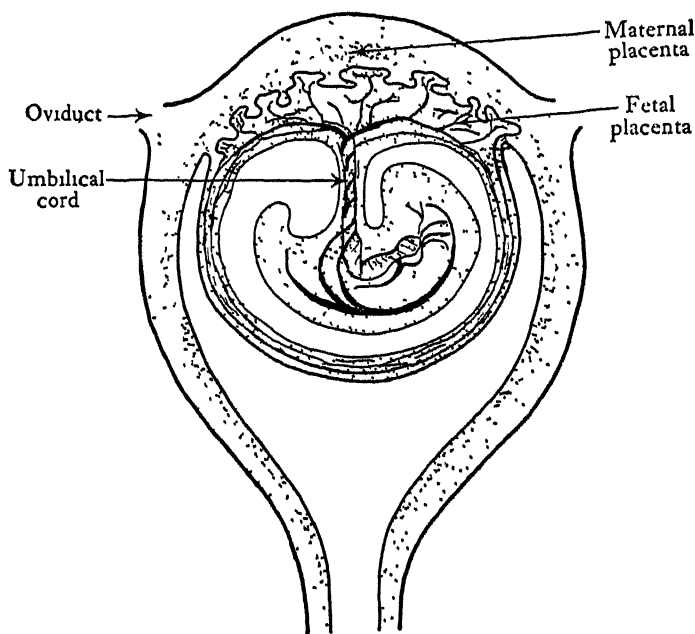


FIG. 3. SHOWING MODE OF ATTACHMENT OF FETUS TO WALL OF MATERNAL UTERUS

Adapted from diagram in Kingsley's *Textbook of Vertebrate Zoology* Used by permission of Henry Holt and Company. This is a generalized diagram not representing the situation in any particular animal.

organs become connected with the developing nerve-fibres. After this happens a new kind of activity gradually becomes possible, that is, activity involving responses of the whole organism to particular stimuli. It is only this sort of neurally conditioned activity that some psychologists call behavior. But the author would apply the term behavior to any activity of an organism as a whole, whether or not a nervous system is present as, for example, to the activity of an amoeba in response to stimuli.

The appearance of neural tissue in the embryo, however, does make possible more integration in the behavior of the organism. As muscles and glands take form and are supplied with motor nerve-fibres, more specialized responses are

possible, as well as more discriminative responses, in the sense of responses to finer details of the sensory environment. Finally with the development of the central parts of the nervous system still greater integration is possible. Apparently the child at birth has all the nerve cells it will ever have, but they have not yet reached their full size, nor have their fibres attained their final richness of branching. Many fibres at birth still lack the fatty covering (myelin sheath) which some authorities believe is essential to their normal functioning, and the cerebral cortex is probably not capable of mature functioning.

It is clear, then, first, that the behavior which is dependent on the functioning of the nervous system only gradually develops before birth; and second, that as the nervous system and other parts of the body continue to grow after birth, so must the correlated behavior gradually develop.

At present psychologists are engaged in a lively discussion as to the character of the first "real" (neurally based) behavior in the developing organism. They draw for evidence upon studies of development in animals as well as human beings. Interest in this subject is particularly keen because to some of the participants in the debate (though not to the writer) rival psychological theories seem to be at stake. "Whole psychologists" cite in favor of their general psychological approach the studies of biologists like Coghill and of psychologists like Irwin. These men emphasize the generalized character of early behavior, even of behavior after the nervous system begins to function. They have not reported evidences of response to a specific restricted stimulus, in these early stages of growth; and Irwin argues that all behavior develops out of an early matrix of undifferentiated activity. This pleases the psychologist who likes to dwell on the priority of the *whole* and the later "emergence" of parts. Other psychologists, though admitting such early "generalization" in pre-neural stages, see much more specificity after the nervous system develops.

In the opinion of the author it does not make a bit of difference, as far as the theory of mental activity or adaptive behavior is concerned, whether specific responses appear early in fetal life or late; but she will try to present the evidence

to aid those who do wish such physiological support for their theories. Meanwhile she will be accomplishing another aim, namely by showing how behavior develops in the prenatal period when specific practice of many complex acts is impossible, to throw light on the development of similar activities after birth. In order to understand the important problem of instincts, we must know something about the prenatal development of behavior.

THE GENERAL COURSE OF PRENATAL BEHAVIOR DEVELOPMENT

Methods of Study. — It has been possible, of course, to study prenatal behavior in the higher animals much more intensively than in human beings, using especially the method of operative removal of fetuses. In lower vertebrates such as frogs and salamanders where early stages of growth take place in an external medium (water), important direct observations of early development may be made. The development of bird embryos has been studied through a "window" in the egg. In human beings direct observation of normal prenatal growth is impossible, but through reports of the mother on spontaneous movements, and to a certain extent through external observation of movement through the abdominal wall, information can be gathered. By means of a stethoscope beating of the heart can be detected by the fifth month and even earlier.

When considering reports on observations of operatively removed fetuses, the student should keep it in mind that the behavior of the fetus can not be entirely normal since the operation has produced new conditions, and there has also normally been progressive asphyxiation of the fetus, and sometimes progressive cooling. Observers of fetal life in animals, however, by keeping the fetus in a special solution and by using various devices to maintain conditions something like the normal ones for a while, have recently been able to observe what they believe to be approximately natural behavior. In any case the observations are of great value, for any positive response observed is proof of capacity, though the manner of the response may be influenced by the particular experimental conditions.

To illustrate certain general features of prenatal behavior development we shall describe some of the chief stages of that development in guinea pigs and in human beings.

Outline of Prenatal Development in Guinea Pigs. — In illustrating the growth of behavior in animals we shall draw on Carmichael's study of prenatal guinea pigs.¹ It is the most systematic study that has been made of that animal, involving repeated stimulation of the same body areas during the whole course of prenatal behavior in many different fetuses. In this study the behavior was more normal than in most other studies of mammals because of the special technique employed. Moreover the 178 fetuses were studied independently in irregular order, some of the oldest first, so that the natural tendency of the observers to read their own theories into the behavior observed was to some extent counteracted.

In studying the results of the systematic stimulation employed in Carmichael's study, it is clear in the first place that in all the individual fetuses studied the main definite responses noted make their first appearance in a certain order. The number of days between copulation and birth in the guinea pig is about 68 days. The fetal heartbeat was observed in nine animals at 27 days, but Carmichael does not consider this rhythmic contraction, which occurs without neural control, to be true "behavior." At 28 to 30 days spontaneous bending of the neck accompanied by bending of a foreleg was observed. Trunk movements also occurred spontaneously, accompanied by movements of the limbs. The first definite response to an experimental stimulus occurred at 31 days when contact applied to the concha (inner part) of the ear elicited definite fore-leg movements accompanied by a bending of the neck, the forelimb being raised slightly. Here we have the first stage in the development of the protective wiping reflex which is characteristic of post-natal life.

The descriptions of the fetal responses up to 68 days show so much complexity, so many responses are occurring in a

¹ L. Carmichael, "An Experimental Study in the Prenatal Guinea-pig of the Origin and Development of Reflexes and Patterns of Behavior in Relation to the Stimulation of Specific Receptor Areas during the Period of Active Fetal Life," *Genet. Psychol. Monogr.*, 1934, 16, Nos. 5 and 6

given animal at the same age, and the responses vary so much according to the condition of the fetus and the kind of stimulation applied, that it would be impossible to make a clear list of all the main modes of response with the time at which each may be expected to occur. But from the report it is perfectly clear that there is a certain age range within which a given response is capable of occurring, and that no amount of stimulation before that time will elicit the response. And if we study the data with reference to the development of any one type of activity, such as locomotion, the sequential nature of development appears more clearly. The ability to "get over the ground" does not appear suddenly at any one time, but, one by one from early prenatal days appear leading patterns which finally make locomotion possible (when the newborn pig is strong enough). In the guinea pigs of this study such early appearing patterns included, mentioning the earliest ones first: (1) neck-flexion and forelimb movement; (2) "crossed extension movements" — e.g., if a fore-limb is stimulated the opposite hind limb may be extended, (3) trot or paddling movements; (4) coördinated swimming movements executed in the fluid-bath during the experiment; (5) walking, possible a short time before the end of the normal gestation period. These are only leading larger patterns, many others being involved.

Thus if we look at prenatal behavior development not as a whole but with respect to certain "behavior patterns" in which we may be interested, we can discern, Carmichael's data show, that each pattern undergoes a series of changes during fetal life. He distinguishes five stages: (1) Stimulation of the area under consideration releases typical gross limb-muscle and trunk responses, as is illustrated by the first neck and foreleg movements on stimulation of the ear (31 days). (2) This pattern becomes stronger and more adaptive — for example, the stimulated point on the ear is actually brushed by the paw (40 days). (3) A pattern of finer movements is now *also* released by the stimulation. An example of this is the activity occurring in one animal at 50 days. "The head was rotated slightly after stimulation and then with a minimum of other body movements the homolateral leg (leg of the same side) was brought up so that the *digits* of the paw cupped (that is, flexed) over the stimulated concha. The

paw then brushed on down the face and back to its resting place." (p. 380.) (4) In this stage the pattern of responses frequently (not always) becomes less complete than formerly. For example, at 32 to 35 days stimulation of the lower eyelid led characteristically to movements of limbs and sometimes of the head and of the rump; but from about 36 days on the responses recorded are more often only "a sharp, quick wink," or "a marked wink of the closed lids," and the like. It is significant that the early stimulation of the lid was followed only by the larger muscle responses, and did not include the wink at all. (5) In many areas but by no means all, in the latter part of prenatal life the stimulus-area for a given pattern of behavior becomes more restricted, and the response quicker and more precisely localized.

In the same period of fetal life, in the fifth stage, it can be seen that previously distinct patterns of response now occur at the same time in response to a particular stimulus, forming a new and larger pattern of response which is effective in changing the orientation of the whole organism in relation to the stimulus. Thus the stimulation of the nostril which in early fetal life released only neck and forelimb reactions, at 60 days releases paddling or swimming movements effective in avoidance behavior. Fetuses actually swam away in the saline bath as far as the length of the cord, by which they were still attached, would allow them.

In this fifth stage then, we find not only a limiting of the field of effective stimulation (for many areas) with greater specificity of response; but we find also that a stimulus which formerly released a rather specific and definite pattern of response now releases a much more complex pattern involving many part-activities that had previously functioned independently. In other words, in the prenatal behavior-development of the guinea pig we see two tendencies clearly illustrated, depending on what aspect of the total development we are describing, one, an increase from a more or less diffuse type of activity toward greater specificity of stimulus and of response; and the other, increasing integration among various activities of the animal which formerly occurred in relative isolation.

Reports in recent years on the many other animals (cats,

white rats, frogs, birds and the like) in which embryonic and fetal development has been studied, agree with Carmichael's findings in that they reveal an "unfolding" of behavior patterns in a sequential order which is about the same for all the members of the species studied.² As a rule these studies emphasize more than Carmichael does the generalization, the diffuseness, of early behavior, though they all report the "emergence" of definite patterns at various times in fetal life.

Indeed, the tendency in recent years has been to see no specificity in early fetal stages. There are probably several reasons for the divergence in the reports. First, some of the animals studied (notably the salamander studied in the series of brilliant researches reported in Coghill's *Anatomy and the Problem of Behavior*) are structurally more simple, and thus perhaps more likely to respond "as a whole" than animals like the guinea pig. Second, in some studies the "pre-behavior" stages not under neural control have received the emphasis. In the early cellular stages and those in which there is response of the whole tissue-mass to direct stimulation, there is of necessity more "general" (not generalized) behavior of the whole organism. Third, the behavior of an animal may sometimes look diffuse and generalized to an observer, but actually it may consist of many simultaneously occurring reflex responses to a complex internal stimulating situation, such as gastric contractions or a change in temperature. Fourth, in the last twenty years there has been a strong and sometimes an emotional reaction against an older naive assumption that behavior consisted at first of simple reflexes, only later integrated. This reaction has probably swung too far in the direction of "wholeness," leading observers simply not to notice evidences of relative specificity in behavior under observation. Scientists, like ordinary people, tend to find what they are looking for.

Outline of the Development of Human Prenatal Behavior. — Because of the impossibility of systematic experimental study of human prenatal behavior we have had to rely for the most part on chance clinical observations made

² Even a beginning student will be interested in the clearly written short book by G. E. Coghill, *Anatomy and the Problem of Behavior*, Macmillan, 1929, which describes in detail structural and behavior growth in the salamander.

by doctors or physiologists, particularly those of Minkowski ; and the behavior of the fetuses is not entirely normal, for reasons previously given. It is so difficult to summarize the scattered and often conflicting reports that we shall here make use of the interpretative summary made by Evelyn Dewey, whose point of view differs from Carmichael's in that she leans strongly toward the "mass-movement theory":

"Spontaneous movements of operatively removed fetuses occur at about the end of the second month of pregnancy. These are probably aneural or idio-muscular in character, and at this age external stimulation apparently evokes no reactions. The first aneural spontaneous movements are worm-like contractions of the arms, legs, and thorax. After the second month the movements are slow, asymmetric, arrhythmic, and uncoördinated, and very variable as to the parts of the body involved. The reactions to external stimulation are of the same character. With increasing age the movements become less variable, and there is a progressive increase in specificity and coördination, until by the time of birth most of the commoner special reflexes have become more or less established."³

At the end of the seventh month the fetus is able to respond in all the main ways that the full-term newborn baby does, as is shown by the behavior of prematurely born children. But at this time, as indeed at the end of nine months, the behavior of the organism still tends to be general and diffuse. The transition from the intrauterine to the outside environment arouses responses in the seven-months baby that normally would not have occurred until birth, but the fact that they now occur shows that the mechanisms of response are already well developed.

Neonatal Equipment and Development.—Birth marks only a few changes in the growth and functioning of the organism. Most of the old functions continue as before, but in a few respects new adjustments must be made. The baby now takes in air through the mouth and nose and breathes through the lungs, the mechanisms for such activities having for some time been mature and capable of functioning in response to the proper stimulus. He also takes his food

³ Evelyn Dewey, *Behavior Development in Infants*, Columbia Univ. Press, 1935, pp 56-58.

through the mouth and mere contact with the mother's nipple is followed, sometimes after trial and error, by reflex sucking and swallowing movements. Except for such modifications of customary ways, the life of the newborn baby goes right on much as we must suppose it went on before birth, the only differences being first that the organism is now exposed to a much wider environment, with new sorts of contact, temperature, visual and other potential stimuli around him; and second that his range of possible movement is greatly widened.

From birth through the first ten days or two weeks (a period called by many authorities the neonatal period), we have extensive reports of first-hand observation and many reports of experimental studies, because during that time it is now common to have babies remain in the nursery of the maternity hospital, where they are accessible to observers. The first extensive modern report of the infant's equipment at birth, based on general observation and responses to experimental stimulating situations, was made by Mrs. Blanton in 1917 under the direction of J. B. Watson.⁴ Within the last ten years we have had many valuable experimental studies, chief among them being the series of researches begun by A. P. Weiss and his students at Ohio State University. In this work the investigators employed a specially constructed experimental cabinet, illustrated in Figure 4. This was equipped with devices for giving stimuli and for recording objectively the chief responses of the infant, and with windows through which observers could watch, yet it was so comfortable that the infants were in what was essentially a natural situation.⁵

Observers are agreed that at birth the human infant is equipped with a large number of fully developed adaptive modes of response, some very complex. Immediately after birth, or even, in the case of some responses, during the birth process, the infant may cry vigorously, yawn, sneeze, stretch,

⁴ M. G. Blanton, "The Behavior of the Human Infant During the First Thirty Days of Life," *Psychol Rev*, 1917, 24, 458-483.

⁵ The student should study the description of this apparatus and the technique used, in K. C. Pratt, A. K. Nelson, and K. H. Sun, *The Behavior of the Newborn Infant*, Ohio State Univ. Press, 1930, 10-21. Other methods of study are cited in K. C. Pratt's article on the neonate, in the *Handbook of Child Psychology*, 1933, 2nd ed., 170-172.

sigh, cough, smile, hiccough, kick and wave the arms, turn or raise the head if the nose is not free, and go to sleep. The pupil contracts, though irregularly, in response to light, and the eyelid, touched, may blink. All the special senses are

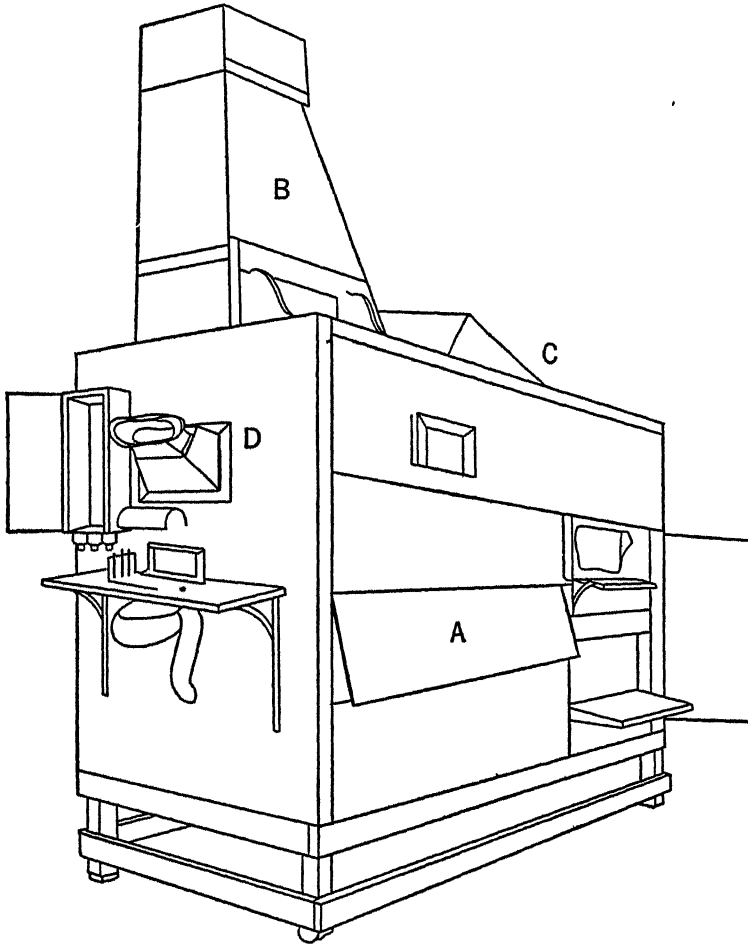


FIG. 4. DIAGRAM OF EXPERIMENTAL CABINET FOR THE STUDY OF INFANT BEHAVIOR

The stabilimeter is located within the cabinet. *A* is a horizontal hinged drop door. *B* and *C* are supports for the camera and lamp for taking moving pictures. *D* is a window with a head piece through which the recorder observes the infant. (Modified from diagram in Pratt, Nelson, and Sun, *Behavior of the Newborn Infant*.)

capable of functioning at or very soon after birth, although the evidence is conflicting as to just how soon, and in what way, some of this functioning takes place. There is response to change of position of the body or parts of the body (that is, to proprioceptive stimuli). The infant is shown by experiments to exhibit regular stomach or hunger contractions. Both duct and endocrine glands secrete. Regular digestive and eliminative activities take place. There is even evidence of activity in sex organs; for example, erection of the penis is sometimes observed in newborn boy babies. Under certain conditions the infant may assume the attitude of tenseness, with trembling, holding of the breath, and reddening of the face and the like, which observers call fear or anger, or it may relax in a "contented" way, sometimes smiling. It grasps tenaciously a finger or rod touching its palm. Held carefully in a suitable position, the baby shortly after birth makes regular alternate stepping movements when the feet come in contact with the floor, and can also execute definite though ineffective crawling and swimming movements. In the newborn child there is indeed a wealth of highly adaptive reflex activity of *the organism*.

The last words call attention to the fact that these reflexes, although clearly discernible, are only aspects of the behavior of the whole organism. Recent writers have dwelt on the diffuseness and "generality" of the behavior of the newborn, using the term *mass activity* to describe it.⁶ But much of this generality seems actually to consist of responses which are essentially reflex in character, to a complex *internal* stimulating situation, including chemical changes and probably stimuli from the hunger contractions of the stomach. When hungry (which may be often) the baby squirms and wriggles; if not fed he also cries, moves arms, feet, eyes, is indeed "a mass of general activity." But this activity is related to a definite stimulating situation and subsides when the response occurs which changes that stimulating situation. A touch on the lip or cheek causes the head to turn in the direction of the touch, sucking, often after a little initial fumbling, takes place rhythmically, and the general activity dis-

⁶ Among psychologists Irwin especially has urged this view. See his series of articles, "The Organismic Hypothesis and the Differentiation of Behavior," *Psychol. Rev.*, 1932, 39 128-146; 189-202, 387-393

appears. Until the infant is satiated and falls asleep, almost any stimulus may lead to renewed sucking.

After feeding is over, however, many different stimuli will elicit characteristic reactions. Some of these, Pratt, Nelson and Sun point out, are fairly specific with regard to both stimulus and response, such as sucking when the lips are touched, and the plantar reflex (bending the foot and moving the toes) when the sole of the foot is stroked. But even these are not invariably clear-cut single responses to simple definite stimuli; and many reflex responses which later in life are more restricted, are now more or less generalized. The same response may be called out by a variety of stimuli — sucking, for example, being elicited by temperature, taste, and smell stimuli, and by touching areas on the cheek and chin and below the nose, as well as the lips. Again, in addition to the particular reflex response which the observer is looking for, many others may also occur, as when a colored light released not only eye movements (constituting 73 per cent of the responses), but also many movements of the head, of the trunk, and of the arms and legs (pp. 65-78). As Pratt, Nelson and Sun say in summary, "Any stimulus may release any reaction."

In addition to these more or less "patterned" responses the infant also exhibits a good deal of spontaneous activity not like the marked response to gastric stimulation — its limbs, abdomen, head, or whole body, are often in vague motion though no special *external* stimulus is operating. In this complex activity it is difficult or impossible to detect or name specific responses, and the name "mass activity" seems not an unreasonable one to apply. The same term might also be applied to a restless adult, or to a very hungry or a very angry adult, but in the baby these sorts of general activity are certainly much more common — they are indeed at first the dominant types of behavior. We may assume that internal stimuli such as chemical changes or external stimuli such as wetness or change of temperature often underlie this spontaneous activity.

The newborn child is far less advanced in his life history than is the newborn guinea pig, which within twenty-four hours behaves much like an adult pig. Clearly in the human neonate we have a situation akin to that of the guinea pig in

early fetal stages — the nervous system and other tissues of the body are still so immature anatomically and so relatively unorganized in their activity that as yet there are relatively few clearly defined responses; very rapid growth is still going on and there will be much change in behavior just as there was much change in the behavior of the fetal guinea pig.

Observation of babies during the first two weeks reveals, as we should expect, the same kind of development that takes place in the later fetal stages in the guinea pig, though the rate is slower. Pratt, Nelson, and Sun observed an increase in definiteness of response from birth to 11 days. For example, the infants who responded at first not only with eye-movements but also with considerable general bodily activity, showed no such general bodily response to this stimulus at 11 days, whereas the number of eye-movements remained the same. Thus these "proper" responses to the light stimulus, now stood out definitely (pp. 63, 76). These experimenters noticed also the same tendency toward increasing restriction on the stimulus side that Carmichael and others have observed in fetal animals. For example, from birth to 11 days the temperature and smell stimuli which at first released sucking responses, become more and more ineffective in doing so, while sugar solutions release more sucking reactions as the infant becomes older. The range of effective stimuli is now narrower.

The authors conclude that "even within the first two weeks one may observe a restriction of the generalized reactions as indicated by a decrease in the number of effector segments and an increasing specificity in the reactions to stimuli."⁷ The general course of behavior development is, then, much like that of the guinea pig in fetal stages, and at birth the child has yet to undergo a long series of developmental changes before he will be able to make the fundamental kinds of adjustment characteristic of man. The baby after birth is exposed to a wide and varied environment. But for a while he is little affected by that new environment. He does not seem to hear at all until at least a few hours after birth; he responds to bright lights with eye-movements, but not usually in a coördinated way. Until he is touched or picked up

⁷ Pratt, Nelson, and Sun, *The Behavior of the Newborn Infant*, p 208

he pays no attention to other people. He does not lift his head nor turn on his side, nor make any definite sounds except explosive cries or vague grunting or whimpering sounds. He stays where he is put, and for some time retains the curled-up posture that was necessary in the uterus. He sleeps most of the time. But he is growing, and growing fast.

It is clearly an arbitrary thing to interrupt a description of the growth of the child at this point, or at any point — growth is continuous, gradual, and unified. But before going on to describe and illustrate the general character of early postnatal growth, it will be helpful to consider, while the process of prenatal and neonatal development is still fresh in our minds, certain factors which are profoundly important in that development.

NORMAL ENVIRONMENTAL FACTORS IN DEVELOPMENT

On first thought, considering the orderliness of prenatal development both in animals that have been studied and in man, one might be tempted to look upon the whole process as "hereditary." And certainly hereditary or, more strictly speaking, phylogenetic, factors must be basic. Otherwise we could not account for the fact that the organism originating from a fertilized egg of a certain species goes through a regular course of development both in structure and function, the various organs and functions appearing in the same order (though not at exactly the same time) in all normal members of the species. But to say that essential factors in this orderly development must have been already present in the parent cells, is not to say that environmental factors were not just as essential.

1 **The Intrauterine Fluid Environment.** — The fluid surrounding the embryo as it grows constitutes the immediate environment of the organism and in both the embryonic and fetal stages the organism is dependent on the mother for its blood supply, and hence is affected by anything that affects the quantity or quality of the blood supply. Thus it is from the mother by way of her blood that the developing organism receives its supply of oxygen and also all the nutritive materials required for healthy growth, including the vitamins which research of the last few years has shown to

be of such critical importance. Through the mother's blood also are received the hormones (products of the glands of internal secretion) that, with the nervous system, play so important an integrating and directing rôle in development.

Under normal conditions both the fluid environment and the blood supply will contain the substances and maintain the conditions that are essential for normal growth. This is because in any normal human being the internal body fluids must maintain a constant condition or the individual will not function adequately.⁸ In other words, the fluid environment is itself very stable and protected, and little affected by the continual changes in the outside environment of the mother. Thus while the fluid environment is vitally involved in every step of prenatal growth, under normal conditions it is very much the same for all children. Under special conditions, however, it may differ from the normal for a particular child in such a way as markedly to affect his development, as we shall see later.

2 **Intercellular Factors.** — Another type of environmental influence that is essential to normal prenatal growth is also highly stable, namely the influence on the original cell and all succeeding cells and masses of cells, of *surrounding cells and cell-tissues*. We have seen that at first all the cells in the new individual have the same chromosome equipment. At first they all have the same general structure, too. Yet after the first few cell divisions, differentiation occurs. The cells on the outer side form more or less distinct layers, and gradually differences of arrangement and structure appear within the mass of cells. These different layers and parts give rise to the various parts and organs of the body.

Now, Child and his students have pointed out that while this differentiation is going on each cell is being influenced *by the surrounding cells*.⁹ That is, its development is dependent not merely upon hereditary factors within its own cell wall, but also upon stimulation from neighboring parts. We know that all protoplasm is irritable, that is, that it has in some degree the property of conductivity. It is inconceiv-

⁸ W. B. Cannon, *Wisdom of the Body*, Norton, 1932 The automatic maintenance of that condition is called *homeostasis*

⁹ Charles M. Child, *Physiological Foundations of Behavior*, Holt, 1924, chaps. 1, 2, 3, and 12.

able, therefore, that a cell could develop in isolation without being affected in a dynamic or excitatory way by neighboring cells.

There is, moreover, considerable experimental evidence that such a dynamic interrelationship is important in the early stages of development. In flatworms Morgan has shown that a piece of the animal taken from almost any part of the body may give rise to a head, and other experiments on regeneration in lower animals show that the development of a special organ is partly dependent upon its *relation to surrounding cells*, not merely upon inherited determiners within the cells.

These and many other experiments prove that it is not only the genes or hereditary factors within the cells themselves that determine what they are to become, but that there is a complex and essential relationship between each cell and the surrounding cells. Anything that affects that relationship must influence the growth of the individual. There is no reasonable doubt that in a very real sense the growth of the human embryo is partly a function of the dynamic relationships among the various cells which at different stages compose it. These relationships are environmental, in the sense that each cell is affected by its own particular environment, and must respond to that environment adaptively if normal growth is to occur.

3. **Exercise.** — There is some question as to the importance of exercise as a factor in prenatal development. Does the repeated performance of an incipient function hasten its perfection as an adaptive act? Carmichael divided into two groups some salamander embryos which had not yet made any definite movements. One group was kept in tap water and allowed to grow under normal conditions; the others were put into a solution of chloretone which permitted normal physical growth but anæsthetized them so that they did not move. The normal animals gradually developed swimming responses and after some days were swimming about normally. At this time the experimental group was transferred from the chloretone and put into tap water. After a very few minutes, barely time for the effects of the anæsthetic to wear off, these too were swimming about normally. Repeated experiments, carefully controlled, con-

firmed the findings.¹⁰ It is clear that in this case mere growth of structure (maturation), in the absence of exercise, resulted in the development of a mechanism fully ready to function in a complex way, as soon as exposed to the adequate stimulation. Such experiments prove the possibility of such development in human beings, but they do not of course indicate to what extent it is an actuality in human fetal growth, or whether the factor of exercise may not also play a rôle. In the human fetus experimental control is of course not possible. Many authorities consider that exercise probably does hasten development, and point for evidence to an apparent precocity of premature infants in general responsiveness over full-term infants.¹¹

4 **Learning.** — There is similar uncertainty about the possibility of definite *learning* during the prenatal period, in the sense of "modification of an organismic pattern in response to specific stimuli present in the . . . environment at the time of modification,"¹² such that the child will be born exhibiting a mode of response which he would not have had except for the presence of these stimuli. The word *stimulus* is here used in the restricted sense of an agency affecting a sense organ, not such a general influence as may cause one cell-group to affect others, or a hormone in the blood to exert a general effect on growth. Definite stimuli certainly can affect the sense organs of the fetus before birth — kinæsthetic stimuli from the muscles, tendons, and joints, contact stimuli from the skin, equilibratory stimuli affecting the sense organs of the inner ear, and many organic stimuli. There is some evidence that auditory stimuli may reach the ears of the fetus, and possibly even cause definite conditioning *in utero*.¹³ Certainly the conditions for a simple type of learning are present before birth, and it is not unreasonable to suppose that some genuine learning takes place.

There is indirect evidence of the operation of environmen-

¹⁰ L. Carmichael, "The Development of Behavior in Vertebrates Experimentally Removed from the Influence of External Stimulation," *Psychol Rev*, 1926, 33 : 51-58, see also the same author's article, "A Further Study of Vertebrates Experimentally Removed from the Influence of External Stimulation," *Psychol Rev.*, 1927, 34 : 34-47.

¹¹ See Evelyn Dewey, *Behavior Development in Infants*, p. 63.

¹² See the helpful analysis by D. L. Marquis, "The Criterion of Innate Behavior," *Psychol Rev*, 1930, 37 : 334-349.

¹³ Evelyn Dewey, *op cit*, p. 55.

tal factors during the prenatal period, but the effects cannot now be ascribed to any one of the possible sources just discussed. We refer here to differences between identical twins (or identical triplets or quadruplets or quintuplets) which are apparent at birth. Since identical twins develop from the same fertilized egg, their equipment of genes, hence their heredity, must be identical and any differences found among them at birth must be due to environmental factors. It is well known that slight physical differences among such twins are common, one of the most noticeable differences observed being a difference in size or general vitality, which we can easily understand as being related to the circumstance that one of the fetuses, through position in the uterus or other reasons, may receive a more adequate supply of nutrition. There were not only such differences among the neonatal Dionnes, but also differences in the direction (but not the pattern) of hair-whorls and finger prints, the latter a type of difference probably due to intercellular relationships in early stages of cell division.¹⁴ Also in point here is the evidence from intelligence tests, that the average I.Q. of twins and multiple births is lower than that of children in general. This difference, which is possibly illustrated in the case of the Dionnes, we might not unreasonably ascribe to the severe demands put upon the maternal *milieu interne* (internal environment) by the growth of two to five organisms where Nature has provided for only one.¹⁵

Most of these normal environmental factors keep on operating in the same way, of course, as long as postnatal growth continues. The fluid environment of the whole organism is exchanged for a quite different one, but within the child's body the various cells and tissues are surrounded as before by other cells and cell masses, and immersed in fluids.

The foregoing consideration of the various ways in which

¹⁴J. W. MacArthur and N. H. C. Ford, "A Biological Study of the Dionne Quintuplets — An Identical Set" (In W. E. Blatz *et al*, *Collected Studies of the Dionne Quintuplets*, Univ. of Toronto Press, 1937, Child Dev. Ser., no. 11, p. 49.)

¹⁵A. J. Rosanoff, L. M. Hardy, and I. R. Plesset, "The Etiology of Mental Deficiency with Special Reference to Its Occurrence in Twins. A Chapter in the Genetic History of Human Intelligence," *Psychol. Monogr.*, 1937, 48, No. 4, pp. 137, Ruth Byrns and James Healy, "The Intelligence of Twins," *Ped. Sem. and J. Genet. Psychol.*, 1936, 49, 474-478, D. A. Millichamp, "The Mental Growth of the Dionne Quintuplets," No. 12, pp. 13 (in *Collected Studies of the Dionne Quintuplets*)

a normal environment is concerned in the gradual prenatal development of the child shows that even in this period the old question, "Which is more important, heredity or environment?" cannot be given a general answer. Both sets of factors are concerned in every step of development, both are absolutely essential. Our brief sketch of the normal prenatal history of behavior also suggests that when unusual or unfavorable conditions prevail, we may expect the organism (and hence its behavior) to be affected. Cannon's principle of homeostasis undoubtedly works in a striking way so that most infants survive. But it is well known that there is a high prenatal mortality as well as many premature births, particularly among the poorer classes of our population. It is a reasonable hypothesis that the conditions which kill some embryos and fetuses injure others to such an extent that weakness of one sort or another appears in the child after birth.

Scientific research on the period in question has barely begun, and our knowledge of human embryonic development in particular is slight indeed. But already significant work in biological chemistry, endocrinology, the physiology of nutrition, and experimental genetics, to name only leading fields of research, has demonstrated that in animals profound effects on growth and behavior may result from very slight causes. A young animal which ordinarily would become a female develops male characteristics if a male sex gland is transplanted into it. A young salamander destined by nature to be an aquatic animal, living and dying in water, becomes a land animal with both its bodily structure and behavior quite changed, if fed with thyroid; it now lives on land and goes to the water only to lay its eggs;¹⁶ a female guinea pig whose litter mates produce perfectly normal young, herself produces a decreased number of offspring which are likely to be themselves poor carriers of young because she has been subjected to the fumes of alcohol.¹⁷ The offspring of white rats fed during the nursing period on a diet deficient in vitamin B, are weak and do not learn so well as normal rats, though only their mother has received the defective diet —

¹⁶ H. S. Jennings, *The Biological Basis of Human Nature*, Norton, 1930, chap. 5.

¹⁷ C. R. Stockard, "The Effects of Alcohol in Development and Heredity," chap. V of H. Emerson, ed., *Alcohol and Man*, Macmillan, 1933

it is through her milk that they are affected.¹⁸ The germ cells of white rats fed with large doses of alcohol are so injured that the physical weakness and poor learning ability appear in the offspring literally to the third and fourth generation.¹⁹

"Yes, these results are very interesting," some may say, "but the human embryo and fetus are surely more resistant — besides in human society we do not get the extreme conditions we produce experimentally in animals, and we must simply recognize that some human beings are born defective and nothing can be done to change that fact." In answer to such an argument we can cite the fact that as a result of scientific research we can now in certain cases cause an infant who would otherwise become an idiot to grow up a normal child, simply by giving him regularly some little white tablets (a thyroid preparation). And we can call attention to the fact that where economic conditions are bad, where parents are poverty-stricken, there is infant mortality highest, there is disease more prevalent, there is the highest proportion of retarded, irregular, and defective development, physical and mental — and moral.²⁰

It is too easy to make the ready answer that these children die, or suffer and live ineffective lives in the high proportion they do, simply because they come of defective stock. It is reasonable to suppose that if animals can be profoundly affected so, in different degrees or different ways perhaps, can human beings. The true scientist who wishes to heal human suffering will keep his eyes open for all hopeful hypotheses, and will not assume that science has said the last word on the limits of human capacity in individuals, classes, or races until these hypotheses have been put to rigorous test by transforming, in many different ways, the physical, social, and educational environment of the poor.

¹⁸ S. Maurer, and L. S. Tsai, "Vitamin B Deficiency and Learning Ability," *J. Comp. Psychol.*, 1930, 11, 51-62; K. S. Bernhardt, "The Effect of Vitamin B Deficiency during Nursing on Subsequent Learning in the Rat," *J. Comp. Psychol.*, 1934, 17, 123-148.

¹⁹ Ada H. Arlitt, "The Effects of Alcohol on the Intelligent Behavior of the White Rat and Its Progeny," *Psychol. Monogr.*, 1919, 26, No. 4.

²⁰ B. Sanders, *Environment and Growth*, Warwick & York, 1934; Paul de Kruif, *Why Keep Them Alive?*, Harcourt Brace, 1936; Raymond Franzen, *Influence of Social and Economic Factors on the Health of the School Child*, Amer. Child Health Assoc., 1932.

In the opinion of the author it is of vital importance to individuals and to society to consider the various sources of prenatal injury. Her study has convinced her that hereafter the results of research on the prenatal period in animals and man — research that is now barely getting under way — are likely to add a great deal to our ability to control human development for the better, and that sometime many undesirable conditions which are now thought to be natural and inevitable will be prevented through providing a more favorable prenatal environment for all children.

UNFAVORABLE ENVIRONMENTAL INFLUENCES

We shall discuss briefly some of those main sources of disturbance of the normal course of prenatal development which may be largely environmental in character — malnutrition, defect or excess of glandular secretions, toxins, infections, and birth-injuries. All but the last of these affect the infant after birth as before, of course. In fact, many people believe that the effects are serious only after birth, because of the protected situation of embryo and fetus in the mother's body. But disturbances of the internal environment which do affect the prenatal organism may have far more serious effects than the same *amount* of "disturbance" after birth, because growth and development are extremely rapid at the start and the organism is passing through fundamental formative changes. The rate of development gradually slows down until birth and becomes progressively slower after birth.

1 **Malnutrition of the Mother.** — If the mother is *seriously* undernourished or malnourished, so that the embryo does not receive needed elements from her blood, the prenatal growth of the nervous system (as of other parts of the body) may not be normal. One result of such prenatal physical retardation is undoubtedly feeble-mindedness or mental defectiveness in varying degrees. Tredgold believes that while some acquired mental retardation is the result of malnutrition in the first years of childhood, much more is due to malnutrition during intrauterine life. Part of the malnutrition that Tredgold had in mind here is probably caused by iodine deficiency in food or water; and since this is

related to defective secretion of the thyroid gland, it will be taken up under another heading. Whether parental diets defective in other substances, or too scant in quantity, are actually factors in mental defectiveness in human offspring is not certainly known. But studies of the psychological effects of various diets such as are now being made, have produced some positive results and lend strength to Tredgold's hypothesis, (which seems to be based on clinical observations of the prevalence of defective offspring of malnourished parents). When female white rats are fed during the nursing period on diets defective in vitamin B, their young, we have already pointed out, show consistently poorer performance in maze learning than other rats of the same stock and age. If this early postnatal maternal diet can demonstrably affect maze learning, it is entirely reasonable to suppose that the prenatal maternal diet could also. A recent piece of experimental work, done in 1936, showed that "the retention of the maze habit by young rats is adversely affected by vitamin B-complex deficiency, not only during the nursing period but also [in the mother] during gestation."²¹ Of course the ability to learn mazes is not necessarily a reliable index of intelligence in general, but in rats it is an important type of intelligent adaptation. Such experiments demonstrate the *possibility* of a similar phenomenon in human beings.

In recent years the newer study of nutrition has shown the fundamental importance of vitamins in human diet; and it is seen that malnutrition, especially vitamin deficiency, is likely to be more serious than merely insufficient food. A person may have plenty to eat, but be adversely affected in one way or another by lack of essential substances in his food — by deficiency of proteins, for example, or of certain minerals, or of one or more of the vitamins. Such deficiencies have been shown to be important factors in general poor health and in the development of particular diseases, such as pellagra and scurvy; with their mental symptoms.²² They

²¹ A. F. Tredgold, *Mental Deficiency*, 5th ed., 1929. F. E. Poe, A. Wood, C. F. Poe, and K. F. Muenzinger, "The Effect of Vitamin B-Complex Deficiency upon the Acquisition and Retention of a Maze Habit in White Rats," *Univ. Colo. Stud.*, 1936, 23, 147-158.

²² E. V. McCollum and Nina Simmonds, *The Newer Knowledge of Nutrition*, 4th ed., Macmillan, 1929.

are also related to lack of vitality, fatiguability, depression, irritability, and other conditions important in the development of personality. Just as an individual after birth may still grow more or less normally, though showing symptoms of malnutrition, so may the prenatal organism *survive* through the regulation of the "internal environment," and yet be marked for life because the external environmental demands on the mother have drawn too heavily on her internal resources.

About the unfavorable effects of inadequate nutrition in the early *postnatal* years there is no doubt. An overwhelming mass of direct observations by physicians shows that the same deficiencies that interfere with life, growth, and adaptability in the white rat also affect the development of human beings. We are in great need of further research on the psychological effects of diet on animals and human beings.²³

2 **Deficiency or Excess of Some Glandular Secretion** may be acquired before birth (or after too, of course) and affect later mental development. The most conspicuous example of such an environmental effect is the high incidence in certain inland regions of infantile myxedema, a relatively mild disease with mental backwardness, based on thyroid deficiency, and of cretinism, an extreme form of the same disease in which there is mental defectiveness amounting to idiocy, as well as characteristic and repulsive physical symptoms. These forms of myxedema are often associated with goiter, which is an external symptom of thyroid deficiency that is due in turn to a deficiency of iodine in the soil, water, and food of these goiter areas. The goiter or swelling of the throat represents increased activity of the thyroid gland to meet the iodine deficiency (the thyroid being rich in iodine) and cuts down the prenatal margin of safety (homeostatic reserve) so that when there is increased need for iodine, as during pregnancy, it is not available in sufficient amounts. Hoskins says that mothers suffering from colloid goiter are particularly likely to give birth to defective children, and that the offspring of farm animals in the "goiter belts" are often defective at birth.²⁴

²³ Besides the references already given, consult M. F. Fritz, "A Classified Bibliography on Psychodietetics," *Psychol. Monogr.*, 1934, No. 206.

²⁴ R. G. Hoskins, *The Tides of Life*, Norton, 1933

While very often *congenital*, that is, already present in the organism at birth, myxedema may also be acquired after birth. It is an illustration of a condition commonly called hereditary, i.e., determined by germinal factors, whereas it is really congenital or acquired in the prenatal or early post-natal period—a very different situation.

It has been found possible to prevent or to check the development of infantile myxedema and cretinism, whether congenital or hereditary, by the feeding of thyroid extract. The results which have been achieved strikingly illustrate the possibilities of applying science to the control of human life. Cure is by no means always possible. In some cases, where treatment begins late, there may be physical recovery, but not a corresponding increase in mental ability.

Myxedema in one of these forms may be diagnosed too late if at all, either because it looks like rickets or some other disorder, or because the physician mistakes it for one of those types of mental defectiveness which medical science does not now know how to deal with. Parents in cases of unusually slow development in infancy should have the possibility of myxedema or cretinism in mind and secure expert consideration of the case. The author knows a mother in the Great Lakes region whose little boy, after years of intensive treatment for "rickets," was finally diagnosed as a case of thyroid deficiency. The boy, who might well have been today a fine normal youngster, is now an inmate of an institution where he is a hopeless imbecile.

Figure 5 is a photograph of a little girl who was saved by prompt diagnosis and treatment from a similar fate. When examined by Dr. Gesell at 40 weeks she was rated as imbecilic, showing marked physical retardation as well as unmistakable physical signs of cretinism (some of which are evident in the first photograph). At 86 weeks she had made tremendous mental gains, having good average intelligence according to the Gesell schedules and presenting a most attractive normal appearance. In the article reporting this case Gesell and his associates describe five other cases who were given early treatment.²⁵ Although some improved

²⁵ A. Gesell, C. S. Amatruda, and C. S. Culotta, "Effect of Thyroid Therapy on the Mental and Physical Growth of Cretinous Infants," *Amer Jour Dis Child*, 1936, 52: 1116-1138.



FIG 5. 46-S, AGE 26 WEEKS
(20 Weeks Before Thyroid)

46-S, AGE 86 WEEKS
(40 Weeks After Thyroid)

mentally much more than others, in all six cases there was marked mental as well as physical improvement.

Consideration is not usually given to the possibility that minor degrees of mental dullness not associated with definite diseases, may be, as mild forms of myxedema, the result of thyroid deficiency. Hoskins says that "subjects may be found in all degrees of thyroid deficiency from complete normality to complete incapacitation. There are many victims of lesser degrees of thyroid deficiency in whom the diagnosis is seldom made." These may have unimpaired reasoning power but be in poor health, subject to fatigue and unable to endure strain.

Thyroid deficiency may affect the personality adversely as well as "the intelligence," resulting in varying degrees of depression and apathy and even, Hoskins suggests, in abnormal disturbances of personality. It is quite possible, he says, that it may be one of the important causative factors in *dementia praecox* or adolescent schizophrenia, as well as other common types of insanity. Thus not only may cretinism be prevented, or cured or alleviated, but it is possible that in many cases milder degrees of defectiveness may similarly be controlled. Personality disturbances also, including

mere moodiness and "psychopathic inferiority," are *sometimes* definitely related to thyroid conditions and susceptible to thyroid therapy.²⁸

About other endocrine glands and their precise effects on growth we know even yet so little that a discussion of their possible effects on early development is not in order. We need to know a great deal more about the action of the various secretions, and about the variations in the hormone content of the mother's blood and of her milk, as about the effective hormone content of various foods and drugs that may be taken by the child after birth or by the pregnant or nursing mother.

3. **Toxins** may affect unfavorably the normal growth of the embryo. Inorganic poisoning by lead or phosphorus incident to certain occupations, sometimes affects intrauterine development. Toxins produced by the action of bacteria in certain diseases are known to have definite effects.

Experiments on animals and observational studies of human beings show that excessive use of alcohol may have very deleterious effects on offspring. Since it passes through the bloodstream unchanged it may affect the germ cells directly; and so even if the mother does not use alcohol during the pregnancy the infant may be born weak and defective because the male germ cell was affected before union. Excessive indulgence in this drug on the part of the mother during pregnancy may seriously affect the prenatal development of the nervous system, as well as of the body as a whole. Mental defectiveness may be a result, or nervous instability and perhaps other conditions psychologically important. While in some human cases such effects of parental alcoholism seem clearly traceable, the evidence is not clear-cut. Much more research is needed on the effect of size of dosage, length of indulgence, and many other points. Inferences as to exact effects in human beings cannot be based on experiments with animals, and serious difficulties are involved in statistical studies of human beings. Meanwhile, however, the knowledge that important mental effects may be related to parental

²⁸ See R. G. Hoskins, *The Tides of Life*, pp. 80-81. The student may have noticed within the last year newspaper accounts of striking cures of *dementia praecox* through the use of insulin. Work at Bellevue Hospital in New York so far is said to confirm the importance of these findings.

alcoholism at the same time throws light on certain problems of supposed germinal heredity and suggests means of control through prevention.²⁷

4 **Infections.**—The child may be infected before or at the time of birth with the germs of some disease which may be congenital (present at the time of birth), or may develop much later. The most striking example is juvenile syphilis. This is sometimes dormant for years and then may attack various organs or tissues of the body. When it attacks the nervous system it results, if not checked in the earlier stages, in progressive impairment of intelligent capacity ending in complete dementia. There is some indication also that parental syphilis may be a factor in feeble-mindedness, in epilepsy or in "general nervous instability" in the offspring, although evidence on these points is uncertain. There is convincing evidence that motor defects such as paralyzes and disturbances of gait, and sensory defects impairing vision and hearing, are sometimes the result of syphilis in the parents. Thus many disorders in behavior which are sometimes erroneously attributed to germinal heredity, really represent congenital conditions resulting from syphilis in either the father or the mother. The parents may be perfectly healthy themselves, yet carry the germs of this disease and infect an unborn child.²⁸ Another venereal disease which frequently impairs the sensory equipment of the offspring is gonorrhea. The infection in this case is likely to occur at the time of delivery and to cause "eye-trouble" which may develop into complete blindness. Such a result is prevented by the usual careful birth technique employed in first class maternity hospitals.

5. **Birth Injuries and Premature Birth.**—Anatomical and hence mental growth may be influenced before or at birth, or in the early postnatal months, through mechanical injury. Severe blows or falls may possibly cause such injury, but it commonly occurs at the time of delivery in the strug-

²⁷ See Ada H. Arlitt, "The Effect of Alcohol on the Intelligent Behavior of the White Rat and Its Progeny," also Abraham Myerson, *Inheritance of Mental Diseases*, Williams and Wilkins, 1925; and Raymond Pearl, *Alcohol and Longevity*, Knopf, 1926, chaps. v, viii, and ix. Pearl gives a bibliography of experimental and statistical studies. See also Haven Emerson, ed., *Alcohol and Man*, Macmillan, 1933.

²⁸ Harry C. and Maida H. Solomon, *Syphilis of the Innocent*, U. S. Interdept. Hygiene Bd., 1922

gles of the child during difficult labor, or as a result of severe pressure on the soft bones of the skull through the use of instruments. Various forms of paralysis may result, or, though the child appears physically perfect, neural growth may be arrested and feeble-mindedness result. Some authorities believe that factors associated with premature birth, other than specific birth-injuries, sometimes result in mental deficiency.²⁹

It is clear that there is a very genuine and important influence of both normal and abnormal prenatal conditions on the development of the child, and if our aim is to provide favorable conditions for growth, these must be taken into account. Through regulation of environmental conditions with the aim of prevention, it seems that a considerable amount of control can be exerted in the matter of intelligence development, sensory and motor defects, insanity, and allied conditions. Knowing this, people who look forward to parenthood will try to keep themselves free from venereal disease, will refrain from excessive indulgence in alcohol, and will give careful attention to diet and general health of mother and child. Even if an individual has acquired a transmissible defect, proper medical treatment may often make him physically fit for parentage. Syphilis for example may be cured if treated early enough.

From the point of view of social control, our present knowledge suggests important applications. If we call to mind that the chief "prenatal influences" known to be undesirable — malnutrition, alcoholism, venereal infection, and possibly extreme emotional excitement, besides mechanical injury at time of birth — are all more likely to be prevalent in a poor social environment than in a good one, it is seen that one socially important means of control is a general attack on the factors that make the environment poor. This would certainly, in the long run, be more effective socially

²⁹ A. F. Tredgold, *Mental Deficiency*, 5th ed., William Wood, 1929, pp 52-56; E. A. Doll, W. A. Phelps, and R. T. Melcher, *Mental Deficiency Due to Birth Injuries*, Macmillan, 1932; A. J. Rosanoff and C. V. Inman-Kane, "Relation of Premature Birth and Under-Weight Condition at Birth to Mental Deficiency," *Amer Jour Psychiat*, 1934, 13 829-852. A study which minimizes the unfavorable effect of premature birth is, J. H. Hess, G. J. Mohr, and P. F. Bartelme, *The Physical and Mental Growth of Prematurely Born Children*, Univ. of Chicago Press, 1934.

than the prevalent method of dealing with isolated cases in which the effect of the poor environment has already been shown in the character of the offspring.

The student should remember that this is a discussion of the possible effects of abnormal environmental conditions before birth. In ordinary circumstances none of these conditions prevails. If both parents are healthy and the mother is well nourished and lives normally during pregnancy, there is no reason for concern as to the condition of the embryo; certainly no reason to be worried about possible psychological consequences of parental behavior.

When we consider the incomplete state of development of the newborn baby, it is easy to see that this development is going to go right on after birth in about the same way. As in the late fetal period so in postnatal growth will environmental factors continue to interact with genetic factors in shaping that growth. But in early postnatal growth — since the tiny organism is exposed to a very much more complex and unpredictable environment, both physical and social, yet is still in a period of extremely rapid growth when a slight change may produce a profound effect upon development — it becomes all the more important for the psychologist to keep in mind the importance of environmental factors. We shall not treat again, in detail, of the possible effects in early childhood of malnutrition, alcoholism, or glandular deficiency, and we shall barely refer to the possible effects of serious illnesses, accidents, and operations. But for the development of particular children it is clear that any of these conditions might be of the most critical importance, and the student should not forget this fact. Our chief emphasis in this book will be upon the growth of normal children, but the normal child is seldom if ever exempt from all unfavorable influences, and it is not merely academic to consider them. It is of great practical importance, as our account in the next chapters of the main phases of postnatal growth will show, to keep always in mind the organic background of mental life.

SUGGESTIONS FOR READING

The Biological Basis of Human Nature by H. S. Jennings gives the basic facts about heredity and environment with which every serious student of child psychology should have at least a general familiarity. The book is also an extremely interesting and stimulating account of the advances made to 1930 and their significance. See the same author's *Prometheus* for a summary of the same material. For a more technical account see H. E. Walter, *Genetics*, or H. S. Jennings, *Genetics*.

For the significance of the prenatal period the classic treatment of Tredgold is still very stimulating. An excellent treatment of heredity and growth in the prenatal and neonatal periods and of the prenatal care of the mother is to be found in the first (1930) edition of Rand, Sweeney and Vincent, *Growth and Development of the Young Child*, chapters 3, 4, and 5, pp 80-181. *The Tides of Life* by Dr. Hoskins is a particularly stimulating treatment of the endocrine glands, combining scholarship with a social imagination which is too seldom evident in scientific writings. . . De Kruif's *Why Keep Them Alive?* is written with its author's usual dramatic, perhaps over-dramatic, touch but out of a white heat of sincere feeling. This book and Barkev Sanders' *Environment and Growth* should provide adequate motivation to any student of child psychology for a continuing attention to social and economic factors in child development.

CHAPTER IV

PHYSICAL GROWTH AND THE DEVELOPMENT OF OVERT SENSORY-MOTOR ADJUSTMENTS

MENTAL and physical growth are two aspects of the development of a single growing organism, the child. To consider them under separate headings is an artificial procedure. But we cannot keep looking at the whole forest all of the time: to understand it we must find the main trails and learn to know about individual trees. For postnatal as well as for prenatal growth it is helpful to have at the outset some knowledge of the structural "physical" growth. In this chapter we shall deal briefly with the main phases of physical growth, and then with those types of overt behavior which have traditionally been called instinctive. In following chapters we shall continue our consideration of the rôle of heredity in "physical" and mental growth, dealing with native factors in emotion and motivation, and with the rôle of heredity in the growth of particular abilities and of intelligence.

STRUCTURAL GROWTH

A person is a physical organism behaving, and it may be said that his behavior at every step will be modified by responses to internal organic changes that are taking place. He is never free from this influence, whether he knows it or not. A child who has become weak and lacking in bodily vigor will not only feel different (have different intraorganic sensations), but he will behave differently. A baby which is about to cut its first teeth may respond to the internal stimuli involved by changes in behavior long before the teeth actually appear. The adolescent boy whose voice is just breaking is literally more "self-conscious" because he experiences new and strange sensations connected with stimuli from the growth of new structures. His awkward behavior is in part a response to such new stimulation. As new muscular and other body tissue is added, so are new kinæsthetic and other intraorganic receptors, and these are connected by the growth of new fibres

with the central and autonomic nervous system. A consideration of the nature and the chief stages of general bodily development is thus seen to be essential as a background for understanding the growth of behavior, the growth of mind.¹

General Bodily Growth.— During the first year, growth is extremely rapid, the average baby gaining about five ounces a week, doubling his weight at six months and tripling it at one year. During this year the child gains enormously in strength and in motor agility. Although the rate of increase in weight is not quite so high after the first year, there is still very rapid growth until three, and then some slackening between three and five. (See Fig. 6.) Thus especially during the first three years, the child is continually subjected to new stimulation from his own growing body as well as to external stimulation arising from his active exploratory movements.

The curve of general bodily growth as measured by weight and height rises regularly and steeply from three to about twelve. There is a rapid acceleration in both height and weight (the "awkward age") between twelve and fourteen, which is one feature of the prepubertal changes that gradually result in a marked alteration of physical structure. At the same time, of course, definite and important internal growth changes are taking place. The curves for height and weight continue to rise until about seventeen, when the adult age level is reached.

Individual Differences in Rate of Bodily Growth.— The curves in Figure 6 represent the average growth in weight, and, like curves and tables showing growth in height, are of value in showing the general tendency and rate of growth. They are also of value to those in charge of particular children as furnishing a rough standard of comparison. From the practical point of view, however, it is important to realize that there are likely to be not only minor fluctuations in the growth of an individual boy or girl, but marked differences in the general rate of physical growth and the time at which it ceases. The important question, in the case of an individual

¹ For a convenient summary of the chief facts about the physical growth of the child, see K. D. Blackfan, *Growth and Development of the Child*, Pt. 2, *Anatomy and Physiology* (White House Conference on Child Health and Protection, Century, 1933). For detailed accounts of general bodily growth and the growth of particular parts and organs see F. D. Brooks, *Child Psychology*, Houghton Mifflin, 1937, chaps. 5 and 6.

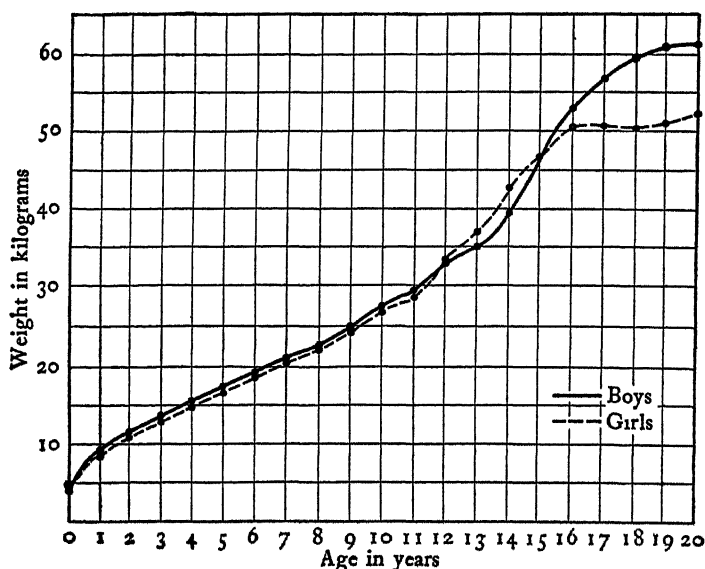


FIG. 6. GROWTH IN WEIGHT FROM BIRTH TO YEAR TWENTY .

The curve for the first five years is based on data from measurements of 18,770 boys and 18,188 girls, reported by B. T. Baldwin, "The Physical Growth of Children from Birth to Maturity," *Univ. of Iowa Stud. in Child Welfare*, Vol. 1, No. 1, 1921. The curve for years six to twenty is based on data from measurements of 8,042 boys and 6,886 girls, as given by Wm. W. Hastings in *A Manual for Physical Measurements*.

boy or girl, is not whether he conforms to the average boy or girl of his age in height or weight or any other of the main indices of development, but whether he is gaining regularly and is in good physical condition.²

Studies of "anatomical age" reveal the fact of enormous but normal individual differences in stage of growth in children of the same age. The term "anatomical age" is used to refer to the degree of physical development which is average for a given chronological age. A child is said to be retarded anatomically if he has not reached the average level of physical development for his age, and anatomically advanced if he has reached a more advanced stage of development than the

² See M. B. Grandpry, "Range of Variability in Weight and Height of Children under Six Years of Age," *Child Develop.*, 1933, 4: 26-35; also, "New Educational Theories and Practices in Connection with the Weighing and Measuring of Children," *Hygiene*, 1930, 8: 754-755

average child of his age. Common measures of anatomical age are dentition, ossification of the wrist bones, and pubescence, and these are held to be considerably more important as indications of rate of physical growth than height and weight, which are rougher measures apparently considerably more influenced by fluctuations in nutrition and general health.

Careful age standards have been established for all these three measures, and by their use it has been shown that children of the same age in years may differ enormously in anatomical age. To illustrate the variation in dentition we may cite Woodrow's statement that the upper central incisors sometimes appear as early as the age of five years and three months, and sometimes as late as nine years and nine months. Hence there is a range of four and one-half years.³ Prescott reported "tremendous variability" in anatomical age as measured by carpal development (growth of the wrist bones) among individuals of the same chronological age. In a group of six-year-old boys he found a range of at least five and one-half years.⁴

When stage of pubescence is taken as an index of anatomical age, equally striking differences in children of the same chronological age are found. Crampton found that among 4800 boys, pubescence occurred in some as early as twelve and a half years, and in others as late as seventeen and a half years. Here we have a range of about six years in anatomical age. Frank H. Shuttleworth, analyzing data from the Harvard Growth Study, found that among 248 girls between six and nineteen years of age, 3.2 per cent menstruated while ten years old, 12.1 per cent while eleven, 33.5 per cent while twelve, 36.3 per cent while thirteen, 10.5 per cent while fourteen, 3.2 per cent while fifteen, and 1.2 per cent between sixteen and nineteen.⁵

³ H. E. Woodrow, *Brightness and Dullness in Children*, 2nd ed., Lippincott, 1923, p. 67.

⁴ D. A. Prescott, "The Determination of Anatomical Age in School Children and Its Relation to Mental Development," *Harvard Monographs in Educ.*, 1923, No. 4, 34-39. See also C. D. Flory, "Osseous Development in the Hand as an Index of Skeletal Development," *Monogr. Soc. Res. Child Develop.*, 1936, Vol. I, No. 3.

⁵ C. W. Crampton, "Anatomical or Physiological Versus Chronological Age," *Ped. Sem. & J. Genet. Psychol.*, 1908, 15, 232. For age of first menstruation in 352 New York girls see F. Boas, "Studies in Growth," *Human Biol.*, 1932, 4: 307-350, 1933, 5: 429-444; 1935, 7: 303-318. See also F. K. Shuttleworth, *Sexual Maturation and the Physical Growth of Girls Age Six to Nineteen*, Monogr. Soc. Res. Child Dev., 1937, Vol. II, No. 5.

When we consider that the different measures of anatomical age all correspond closely in a given child to each other and to general bodily development, it becomes apparent at once that a knowledge of the stage of anatomical development of a particular child is very important for anyone who wishes to understand his moods and feelings, as well as his overt behavior. A mere knowledge of his chronological age is not enough to tell us what stage of physiological development he has reached. One ten-year-old girl, for instance, of a given height and weight, may be profoundly disturbed, inwardly, as a result of growth changes incident to pubescence, while another of the same age and similar general appearance may be still entirely unaffected even by the approach of such changes, and a third five years older than either of these may be still, physiologically, a child and not an adolescent. The same general situation holds for boys. Many adolescents are in the elementary grades, many high school students are not yet adolescent. Few parents and teachers are sufficiently aware of these important facts.

Those striking individual differences in rate of physiological development are of far more practical significance for people interested in individual children than the relatively small sex differences in rate of maturing. *On the average* girls reach puberty sooner than boys, but individual differences in age of maturity within the same sex are very much larger than the sex difference. Figure 7 illustrates how striking individual differences in anatomical age may be, and implies the desirability of an accurate knowledge of the development of the particular child under consideration. It should be remembered that mere inspection is not enough to establish anatomical age, particularly since height and weight are rather unreliable indices.

Growth of the Nervous System. — The nervous system increases more rapidly in weight after birth than the rest of the body. It has attained one-fourth its adult weight by the time of birth, and nine-tenths its adult weight by the age of six. The number of cell bodies is apparently complete at birth, and the neurons grow, up to physical maturity, through increase in size and richness of terminal branching. A small part of the growth of the nervous system consists in the "medulation" of fibres which at birth have not yet acquired



· FIG. 7. CHILDREN OF THE SAME CHRONOLOGICAL AGE BUT
DIFFERING IN ANATOMICAL AGE

These children are all 13 years of age, and all above *I.Q.* 130. The range in anatomical age is at least four years, and the range in educational accomplishment is three years. They show marked differences in social maturity as indicated by social attitudes and participation in social activities [Reproduced by permission from Baldwin, "Methods of Selecting Superior or Gifted Children," chap. ii, in *Twenty-Third Yearbook, National Soc. for the Study of Education*]

the characteristic fatty white sheath, or medullary sheath. Medullation of cortical fibres continues during infancy, through childhood, and even, it seems, into middle age.⁶

We know little of the physiological significance of this postnatal neural growth. The fact that in congenital idiocy cortical cells are scantily branched, suggests that increase in richness of branching of the neurones is one basis for the growth with age of intelligence (in the sense of capacity for intelligent behavior). Increase in gross weight would not seem to be closely correlated with such growth of intelligence, since it has been shown that there is no significant relation, in adults, between brain-weight and intelligence as measured by tests. Medullation may be necessary to the functioning of the neurones, and if so, part of the growth in complexity of mental activity in general may be dependent upon increasing medullation. It is believed that the helplessness of the newborn infant is connected with the fact that great tracts of fibres connecting the cerebral cortex with centres in the spinal cord are unmedullated at birth.⁷

POSTNATAL BEHAVIOR DEVELOPMENT

It will be interesting to see whether the decreasing rate of growth which we have seen to be characteristic of structural development also holds true for the development of behavior. We saw that in the prenatal period of human life the rate of change is tremendous. In these nine months the baby has actually passed through the main stages of growth that in the history of the race required many millions of years. He has developed from a single microscopic cell like the simplest protozoan into an intricately functioning organism capable of very complex discriminations and adjustments. We have seen that between birth and physical maturity the child's physical growth, as reflected, for example, in the curve of weight, continues steadily but at a constantly decreasing rate, by far the greatest progress being made in the first three years. The nervous system is also undergoing very rapid

⁶ H. H. Donaldson, *Growth of the Brain*, London, 1895, Contemporary Science Series, Havelock Ellis, ed., Vol. 29

⁷ O. R. Langworthy, *Development of Behavior Patterns and Myelination of the Nervous System in the Human Fetus and Infant*, Carnegie Inst. of Washington, 1933, (No. 443) Contr. To Embryol. No. 139

growth during these years. Does the growth of behavior proceed at a similar pace?

THE DEVELOPMENT OF OVERT SENSORY-MOTOR ADJUSTMENTS

In recent years psychologists have made careful studies of the early motor development of children. These technical studies along with studies of animals, read in the light of such general accounts as the condensed biography of Ann, enable us to interpret the rôle of heredity and growth in early motor development more effectively than was possible ten years ago.

Character of Studies in this Field. — Most of the studies that have been made on early human development consist of intensive controlled observational study of the natural growth of one or a number of infants, tests and simple experiments being used at intervals, with still or motion pictures of the chief activities constituting an important part of the record.⁸ The highly controlled experimental studies of the Ohio group cited in chapter three have furnished valuable data on short periods of development.⁹

One investigator sought to find out how much environment can do by bringing up a baby ape and a baby child under the same very stimulating conditions for a year.¹⁰ The ape went through the same stages of gross motor development that other apes do, and at a comparable rate. She did not learn to speak, which is not surprising considering the probable structural limitations of the vocal apparatus, if not the brain. But she did develop unusual skill, as well as refinements of manner and disposition which are never found in apes growing up in their natural environment. Another investigator used a contrasting method when he and his wife brought up two normal children (not their own) from the

⁸ Some examples are . L Burnside, "Coordination in the Locomotion of Infants," *Genet Psychol Monogr*, 1927, 2 : 284-372 ; A. Gesell and H. Thompson, *Infant Behavior*, McGraw-Hill, 1934 , M. Shirley, *The First Two Years* (three volumes), Univ. of Minn. Press, 1931, 1933

⁹ K. C. Pratt, A. K. Nelson, and K. H. Sun, *The Behavior of the Newborn Infant*, Ohio State Univ. Press, 1930. See also, O. C. Irwin, "The Amount and Nature of Activities of Newborn Infants under Constant External Stimulating Conditions during the First Ten Days of Life," *Genet Psychol Monogr*, 1930, 8, 1-92

¹⁰ W. N. Kellogg and L. A. Kellogg, *The Ape and the Child*, McGraw-Hill, 1933.

end of their first to the end of their fourteenth calendar month under conditions of greatly restricted activity.¹¹ These children finally developed all the normal modes of motor adjustment, but each activity was delayed significantly beyond the upper age limit for the appearance of that activity in normal American children. As soon as the fact of significant delay for any one activity was established, the children were given a chance to exercise that activity.

A more valuable method of direct attack on the problem of the rôle of maturation is through the use of control groups of children taken at the same initial stage of development of a function, one group receiving training and the other not. This method is practicable and has been used for studying the development of a "non-basic" ability (such as buttoning and unbuttoning) over a short period. But in the study of the growth of fundamental activities it would be highly impracticable to obtain a large enough control group which could be deprived of exercise or practice, and entirely too difficult to see that the conditions of an experiment were carried out. It would, for example, even if parents would coöperate, be very difficult to find evenly-matched groups.

Fortunately Nature has provided the psychologist with material for a highly valuable method of study, that of co-twin control. One of a pair of identical twins is given special practice in a function while the other is not, both being tested at the beginning and the end of the practice period.¹² The inheritance of the twins being identical (save for the effect of prenatal differences which are usually slight), this method makes it possible to estimate the rôle of specific practice in the growth of the particular function being studied. In the case of twins nature has already done the equating better than man could, and even one pair of twins would furnish significant data. Of course both fraternal and identical twins can be studied, with great profit, without artificial restriction of

¹¹ W. Dennis, "The effect of Restricted Practice upon the Reaching, Sitting and Standing of Two Infants," *Ped. Sem. & Jour. Genet. Psychol.*, 1935, 47: 17-32.

¹² A. Gesell and H. Thompson, "Learning and Growth in Identical Infant Twins. An Experimental Study by the Method of Co-Twin Control," *Genet. Psychol. Monogr.*, 1929, 6: 1-123; H. H. Newman, F. N. Freeman, and K. J. Holzinger, *Twins: A Study of Heredity & Environment*, Univ. of Chicago Press, 1937; W. E. Blatz et al., *Collected Studies of the Dionne Quintuplets*, Univ. of Toronto Press, 1937 contains suggestive observations.

activity, by testing and statistical methods, but for the particular problem of determining the rôle of practice in specific developments, the use of a smaller number of identical twins who can be studied intensively has special advantages.

Dr. Myrtle McGraw has been carrying out an extensive study, not yet completed, of the normal development of 68 infants examined at regular intervals. At the same time she carried out a very intensive study of Jimmy and Johnny, who were at first thought to be identical twins but later were found to be very similar but not identical.¹³ From the age of 20 days the twins spent seven hours a day, five days a week, at a clinic under Dr. McGraw's care. Johnny, who as a neonate was flaccid and less developed and less responsive to stimulation than Jimmy, was stimulated at two-hour intervals while at the clinic, being given practice in every activity he could perform (with new ones added as they appeared) while Jimmy was at the same time left undisturbed in a crib (even after the ability to move about had appeared) with not more than two toys at a time. He was tested along with Johnny at first weekly, then biweekly, and finally monthly. Complete records were kept, including motion picture films.

Even though the twins were not identical, Dr. McGraw's study is nevertheless very valuable as a particularly thorough experimental analysis of the growth of behavior in two individuals against the background of the study of a large normal growing group. Besides she is able at many points to draw significant conclusions as to the effect or lack of effect of the special training of Johnny, when he and Jimmy were seen by tests to be at the same stage of development in a given function and were later tested when only Johnny had had the intensive training. The student should note that reports by Dr. McGraw on a pair of genuinely identical twins will before long be available.

To illustrate the main features of the development of a basic motor function, we shall present a brief analysis of two complex modes of adjustment—(1) walking, and (2) reaching and grasping. Detailed description of these two developments and of many others may be found in the re-

¹³ M. B. McGraw, *Growth, A Study of Johnny and Jimmy*, Appleton-Century, 1935.

cent literature we have cited and should be consulted by the student.

The Development of Walking.—We shall base our treatment of walking on Dr. McGraw's account. She says she was able to deal only with the high spots of the twins' development, and we can but mention here a few high spots of her brief account of walking, which the student should by all means consult.

At two weeks both twins made reflex alternate stepping movements when held under the arms with feet just touching the floor. These reflex movements later waned or were not elicited during a period of two or three months between nine months and a year. At about 50 days both boys began holding their heads up in the plane of the body. Apparently it was not until 80 days that they pushed hard enough with their feet against an obstruction to result in an extensor thrust with stiffening of the knees or the legs. (Ann was reported as pushing with her feet at the beginning of the third week.) The next main step was digital progression or walking forward, chiefly on the ball of the foot and on the toes, while held by an adult. Finally when 269 days old (about nine months) both boys happened each to take a few steps alone, uncertainly, and with constant use of the arms for balance. At the age of 15 months Johnny, the trained twin, was walking alone in a fairly mature way, without using his arms for balancing. Jimmy, perhaps but not certainly because of his relative lack of daily exercise, did not attain this mature stage until one and a half months later.

The conclusion is inescapable that the main stages of this development of erect locomotion must have been largely based on mere bodily growth, involving some neural maturation, since both boys, in spite of the striking contrast in the amount of training received, went through the same general stages at about the same time. We can only think of the growth of swimming in Carmichael's tadpoles, and of the orderly growth of walking behavior in his fetal guinea pigs, which *could* not have received direct practice in walking in the fetal period. This conclusion receives corroboration from the other main studies that have been carried out, and from Dr. McGraw's studies of 40 other infants. It will also seem entirely reasonable, the author believes, to anyone who,

like the parents of Ann, has carefully watched the steady growth of a particular baby in such behavior. It could not possibly be that the environment of all these infants could have been similar enough to cause the *same* succession of main stages in all cases.

Obviously environment is also involved throughout the process as it is involved in all growth. Special features of the environment must influence the style of walking, as well as to a certain extent the time at which a new phase will appear. A painful fall, for example, may cause a long delay in the appearance of the final stages. Dr. McGraw believes that the greater amount of practice of Johnny was undoubtedly responsible for his superior style of walking. The motion picture records, she says, stand as indelible testimony of Johnny's greater agility and control in this performance.

A glance back over the account of the twins' walking shows that in the earliest stages, at birth or soon after, there were basic clear-cut reflex patterns of a rather specific character (alternate stepping movements, lifting of head, etc.) which were not "integrated into" (in the sense of being an aspect of) the complete act of walking until many months after they occurred. A consideration of this course of development also makes it clear that in early stages there was a good deal of accompanying activity which later dropped out. For example, early alternate stepping movements are made in a lunging fashion (the author has repeatedly seen this sprawling performance in young babies) with considerable general movements of arms and other parts of the body. And we recall that the child when he first walks alone reaches out his arms in balancing fashion, later dropping these movements. We have, then, progress from the specific to the general in one sense or one phase of the course of development, and from the general to the specific when we consider other aspects of the same development. We saw that the same sort of generalization could be made for the fetal guinea pigs. (p. 57).

The Development of Reaching and Grasping.—We shall not deal in any great detail with the temporal series of responses that finally culminates in successful reaching for, grasping, and manipulating objects seen at a distance. Various aspects of the series have received intensive investiga-

tion.¹⁴ The strong reflex grasp seen at birth, which is so strong that a newborn baby may lift its whole body off the mattress when clinging to a lifted rod, is the first of the related responses to occur. In the next few weeks the response wanes in strength but reflex clasping of an object in the palm remains. The infant may now be observed to make incipient movements of the arms, then hands and fingers, while fixating an object at a distance. Later he begins to shake or finger an object that he has grasped when it is in contact with his hand. Finally, after evidence of great interest in distant objects accompanied by a good deal of bodily activity, he is able to reach out and grasp an object without the former excess (but necessary) bodily movement.

In this behavior as in walking we see both increasing "integration" and increasing specificity. The increase of specificity is well illustrated in a study made by the author of the final stages in the process of "learning to grasp a rattle," by a four-months-old infant. Tests were begun at the age of one hundred and twenty-nine days. The rattle was held directly above and in front of the baby at a distance of six inches for exactly one minute, or until it was grasped. Preliminary tests had shown that in such a situation there was a great deal of diffuse activity of the whole body, with waving of the arms and rapid kicking of the legs especially prominent, and it had been decided to select the number of kicks of the legs ("useless" movements) as a measure of progress.

The notes recorded at the time on general behavior during the first trial read as follows:

Steady fixation with very intent look (one slight exception). Fixated again when rattle was shaken. Rattle shaken occasionally during trial. Arms in practically constant motion. Usually alternate. . . . Marked squirming movements of trunk, head, and shoulders. Moved legs in unison a great deal. Waved left foot and spread toes. Knee often held flexed. Kicked right foot and moved it back and forth along sheet. Several times (about three) arms brought toward center, nearly meeting. Vocalization — eager grunting sounds — such as not present during few minutes before and after trial.

On succeeding days the baby, whose mother was not will-

¹⁴ Leading studies are: B M Castner, "The Development of Fine Prehension in Infancy," *Genet. Psychol. Monogr.*, 1932, 12. 105-194, H M Halverson, "An Experimental Study of Prehension in Infants by Means of Systematic Cinema Records," *Genet. Psychol. Monogr.*, 1931, 10. 107-286

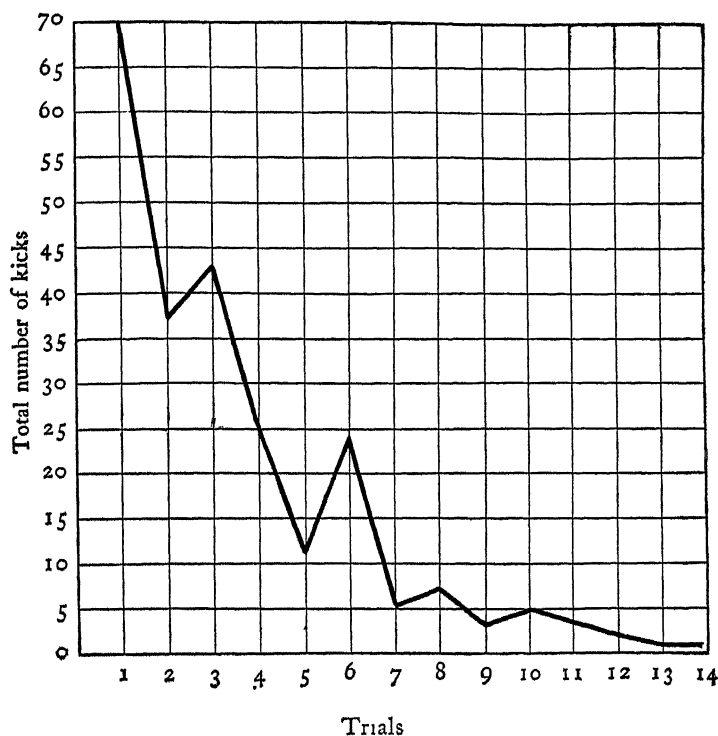


FIG. 8. CURVE SHOWING PROGRESS OF AN INFANT IN GRASPING A RATTLE

ing to make the experiment more "scientific" by depriving her little girl of her favorite occupation during these days, had extra practice in grasping, as the sound of the rattle, left in the crib, was heard several times a day in other parts of the house. But the tests indicate the course of development of the ability. The curve in Figure 8 shows this progress as measured by decrease in number of kicks of the legs. The notes show that this decrease corresponded to a gradual reduction in the amount of general bodily movement. The infant who at the beginning of the experiment was a squirming, wriggling, excited little animal when the rattle was presented, had in a week's practice learned to grasp the rattle promptly with a minimum of general bodily movement. The notes for the trial, when the rattle was first successfully grasped, state, "No squirming or other general bodily move-

ments were observed . . . and there was no vocalization." This held true of later trials.

This course of development is so like the process of learning a complex perceptual-motor skill that the author treated it under learning in the first edition of this text. Studies since reported, however, have led her to believe that maturational factors must be more prominent in the process than modification due to specific experience. Only careful experiments with a good-sized control group, could settle the point, and since few parents probably would lend their babies for a really carefully controlled experiment, we shall hope for a study by the method of co-twin control.

The Main Features of Early Motor Development.—The course of development of other complex modes of motor adjustment is similar in many ways to that of walking and of grasping. The investigations agree that in all normal children certain modes of motor adjustment always appear, such as sitting, walking, and reaching and grasping. They also agree that in the course of the development of each of these main modes of adjustment, certain chief stages of growth involving preliminary or subordinate activities, always occur, and, the most important point, *in the same order in all children*. There is not complete agreement about the details of the process or the "laws" involved, but the main generalization seems secure.

In such a complicated course of development as is involved in the achievement of erect locomotion, the preliminary adjustments (for example, pushing with the feet and raising the head when prone) are usually rather widely separated in time, and are therefore likely to be regarded by the ordinary observer, or even by a psychologist who makes only periodic examinations, as distinct events. But the functional-minded psychologist, who observes closely the whole course of development in a child, realizes that they are actually different aspects of a continuous and unified course of development which finally terminates in the achievement by the child of the distinctively human type of erect locomotion. We might analyze this course of development as a whole, considering sitting, creeping and the like as subordinate phases of, or stages in, the development. Or, adopting a finer type of analysis, we might deal in detail with any particular one of

these aspects of the development, such as rising to a sitting position, or creeping.

The Chief Stages in Development of a Course of Behavior. — Whether we select for analysis a long and complicated course of development or the development of a subordinate aspect of the whole process, we may distinguish certain typical stages or phases in the development. (1) We observe at the start, in the midst of the complex general activity that is characteristic of the infant, certain more or less definite reflexes or patterns of response, which may occur at different stages of growth and have the appearance of being isolated responses. (2) After a period of many weeks or months a number of such reflexes or part patterns will one by one have appeared. Meanwhile the observer begins to see in the infant evidences of internal bodily stress described by such phrases as "He wants the rattle," "He is struggling to sit up." (3) Finally, all the basic preliminary modes of adjustment having appeared, a type of activity which we recognize as important and call by a definite inclusive name, is now possible — and the child "sits up all the time," or "walks alone," or "grasps a rattle" (depending on what cycle of activity is under consideration).

Other Behavior Courses. — At the same time that the series of developments culminating in walking is "unfolding," coördinate or subordinate modes of sensory-motor adaptation are, as we pointed out earlier, also developing, and any one of these, subjected to the same type of analysis that we have given walking, will be found to exhibit similar general features. Dr. Mary Shirley, a pioneer worker in this rapidly expanding field, has made valuable studies of the growth of posture and locomotion (as well as of mental growth) in 25 babies whom she examined at regular and frequent intervals during their first two years.¹⁵ It was she who first pointed out the general sequence of development of responses in the leading locomotor developments of infancy. She listed the various stages in creeping, for example, as (1) chin up, (2) chest up, (3) knee push or swim, (4) rolling, (5) rock or pivot; some progress, (5) scoot backward, (6) creep. The

¹⁵ M. Shirley, *The First Two Years, A Study of Twenty-Five Babies*, vol. I, Postural and Locomotor Development, Univ of Minn. Press, 1931, vol II, Intellectual Development, 1933, vol III, Personality Manifestations, 1933.

student may profitably test Dr. Shirley's analysis or that of the author in other accounts of individual growth.

In our interest in the more complicated sensory-motor adjustments of the first years we have so far not called attention to certain other kinds of behavior growth which occur also in the early months in a predictable way and are undoubtedly to a considerable extent related directly to neuromuscular (and neuro-glandular) maturation. These include the increasing coördination of the eyes, the appearance of blinking in response to a seen movement (which might be but probably is not a learned response), certain changes in such reflexes as the response to stimulation of the sole of the foot, and the gradual appearance within the first eighteen months of the speech sounds that form the basis of all human language. With the exception of the last, the developments named above, and others too, have recently received careful study by psychologists.¹⁶

Do Other Overt Adjustments Mature in Later Childhood? — We have now either referred to or dealt in some detail with the chief of the sensory-motor modes of overt behavior in early childhood that are commonly called instincts, and have found that in their development hereditary or maturational factors are indeed basic. Theoretically there is no reason why new ways of acting of this sort should not appear at any later time in childhood. Actually, however, we have no good evidence that they do, with the sole exception of mature sex responses. Observation of normal children shows that at about two years their locomotor and general sensory-motor equipment is complete in its main outlines. There will be steady growth in strength, and increasing facility in performance, until the child is grown up. Subordinate developments, such as increased ability to use the finer muscles of the body, are undoubtedly based in part, during the earlier years, on neural growth, and so probably are many refinements of behavior, such as the child's increasing ability to balance more successfully in running and walking. Yet no distinctly different kinds of motor adjustment

¹⁶ M. Sherman, I. Sherman and C. D. Flory, "Infant Behavior," *Comp. Psychol. Monogr.*, 1936, 12 1-107, H. S. Lippman, "Certain Behavior Responses in Early Infancy," *Ped. Sem. & Genet. Psychol.*, 1927, 34 424-440, A. Gesell and H. Thompson, *Infant Behavior*.

(with the exception of sex-adjustment) make their appearance after early childhood. The many new skilled performances that are added to the child's repertoire represent the utilization of already present modes of adjustment in response to new environmental situations. Sex behavior we shall treat in discussing in the next chapter native emotion and motivation.

Individual Differences in Sensory-motor Development.

— Although in all normal children the main aspects of growth which we have been discussing exhibit a predictable and in general a sequential regularity, there are striking individual differences — differences in the time at which the various types of response first appear, in the manner of their performance, and in that general aptitude for such activities which we may call motor coördination. Studies that have been made, including biographies of normal babies, show that among entirely normal children some may sit up alone as early as 15 weeks, others, just as vigorous and healthy and living in just as stimulating an environment, do not sit up until 30 or 40 weeks. Some babies take the first few steps alone at 45 weeks, others not until 60 or 70 weeks, still others not until 18 months or even more. Some babies reach and grasp objects at 14 weeks, others not until 25 weeks.¹⁷

That such differences are determined largely by heredity is suggested by the experience of doting fathers and mothers who, trying to teach their offspring these things find all their efforts vain until, after months of effort, the baby in the course of a few days begins to "take an interest" in the activity in question, and, once motivated, makes steady progress. We recall that Dr. McGraw gave Johnny systematic opportunity to walk day after day, three times a day, six days a week, for nearly nine months before he took the first steps alone! The hopeful parent sometimes gets the impression that he might just as well attempt to produce a new tooth when he wishes to, as to hasten the occurrence of the first steps alone.

Fortunately the widespread belief that the early occurrence of these responses is a mark of brightness is not borne

¹⁷ W. and M. G. Dennis summarize the data on time of appearance of various responses in forty babies in their article, "Behavioral Development in the First Year as Shown by Forty Biographies," *Psychol. Rec.*, 1937, 1: 349-361.

out by scientific study. The first "intelligence tests" of infants included many such items, but it has since been found out that scores based entirely on these (for example, the Linfert-Hierholzer scale) show no significant relationship to later scores on such relatively reliable tests as the Stanford-Binet scale. Also, scales in which such items are prominent show a low correlation with later intelligence.¹⁸ The parents, therefore, need not worry unless the baby shows striking retardation in all functions, especially if he is alert and healthy. In case of any doubt they should consult, if they possibly can, a psychologically-trained pediatrician — not a psychiatrically-trained one (because he is likely not to be familiar with the studies on the range of normal differences); not a psychologist only, not a pediatrician only. It is true that serious mental deficiency is associated with marked motor retardation, but only the broadly-trained specialist can make the diagnosis. The reader recalling the discussion of myxedema will realize the need for expert advice.¹⁹

Besides the many individual peculiarities of style of motor adjustments, the little dear and special ways with which no parent would wish to interfere, there are marked differences in the amount of control, ease, and confidence which characterize the movements of little children. Some "natural born awkwardness" may well be, for all we know, really natural born poor motor coördination which is a matter of the genes. Science does not know. Some may well be the result of certain variations in the prenatal environment, or of minor birth injuries, and some of these cases of poor coördination are almost certainly the result of severe or prolonged illnesses or of accidents. In many cases, if they know that a normal environment is just as basic as heredity, parents will wish to provide the best possible conditions for growth and healthy development. The practiced Johnny was more assured and confident, more poised and agile, in all the main developments of the first two years, though at birth he was less promising than Jimmy. Clearly parents should not let any ideas about natural born awkwardness keep them from providing for their babies abundant opportunity for free and happy exercise from the very first.

¹⁸ See the discussion of this point in Chapter VII.

¹⁹ See Chapter III for detailed discussion of this point.

THE PROBLEM OF INSTINCTS

The last ten years' study of the early development of behavior enables us to reformulate in a more realistic way the old problem of instinct. William James wrote in the *Principles* that instincts are acts of the reflex type which are "called forth by *determinate* sensory stimuli in contact with the animal's body or at a distance in his environment," and that they occur "without previous education in the performance."²⁰ This traditional conception, which has the advantage of clearness and definiteness would, if we follow out its logical implications²¹ (as James himself did not), credit animals with many instincts but leave very few to man. Besides the wealth of relatively simple reflexes, including emotional responses to definite stimuli, there could be included with confidence only a few complex *serial* responses, such as sucking, tongue movements and swallowing when the nipple comes in contact with the lips, certain phases of digestion and elimination, and holding an object placed in the hand (after a few weeks from birth). It is significant that the successive stimuli involved in the performance of these acts are internal, though they are all originally initiated by external stimuli. These activities would comply with the ordinary conception of an instinct as a combination of reflexes occurring on appropriate stimulation and in a particular order determined by heredity.

In the other sensory-motor modes of response which we have been considering, such as sitting and walking, and certainly in the very complex activities involved in imitation, gregariousness, and the like, it is clear that the essential responses are not made to determinate, that is, specific stimuli only. In creeping, for example, the stimuli from a smooth floor, from a carpet, or from a grassy lawn, are all different, and the obstacles encountered offer varied stimuli.

It is also clear that the responses in a particular mode of adjustment do not occur in a definite order determined by heredity, as the second part of James's definition implies. In creeping there are many variations in the acts involved, some

²⁰ Wm. James, *Principles of Psychology*, Holt, 1923, Vol. II

²¹ See H. A. Carr, *Psychology*, Longmans Green, 1925, Chapter 16, for an analysis of these implications.

babies hitching themselves along, some rolling before they creep, some going habitually on all fours, some on their knees. It is only the end result that is the same for all. That is, the babies get over the ground without walking.

On the other hand, there is just as clearly a strong hereditary basis for these modes of sensory-motor adjustment. We can predict with absolute confidence that every normal baby will develop these modes of behavior at one time or another, although the exact nature and number of responses involved will differ greatly from child to child. The significant thing to point out here is that if the individual baby is to survive and become a normal adult, he must develop these functions, that is, he must be able to move efficiently from place to place and to manipulate effectively objects in the environment. The course of evolution has produced an animal with such a structure of bone and muscle, gland and nervous system, that as the organism grows it tends to act, and needs to act, in certain general ways. The baby is thus affected by certain internal stresses or tensions (which we shall call needs or motivating stimuli) which impel him to activity until he has attained certain bodily positions or moved his body a certain distance through space.

The striking thing about Ann's sitting up was the tremendous effort expended before sitting could occur, as reflected in the tensed muscles, reddening of the face, and the efforts repeated and persisted in over a period of many weeks. Her violent final effort to stand with the expansive behavior after the first success, and four-months-old Nancy's excited struggles before she could reach out and grasp the rattle, also illustrate the point that the basic factor which is most clearly hereditary [or, if we wish to use the term, instinctive], is not the pattern of acts that are performed, for these vary greatly according to the conditions and the objects around the child. The basic native factor is a strong physiological need or motivating stimulus which becomes dominant at times and leads to persistent activity.

It is clear that when such a special need is dominant, certain responses rather than others are likely to occur — for example, pushing of the feet in creeping, and a reflex grasping movement when the hand is in contact with an object. Corresponding to each dominant need there are many such

"natural" or suitable activities which may be thought of as reflexes or simple reflex patterns. These partial responses may occur long before structural growth has made possible the complete series of acts to which they are related, and hence long before the corresponding internal tension begins more and more to dominate the behavior of the infant. Thus fetal guinea pigs, we recall, very early responded to stimulation of the nostril by characteristic movements of the forelegs, movements finding their place in a complex, immediately useful pattern only much later in fetal life when the pigs were able to swim. Human babies make alternate stepping movements soon after birth, but these do not function in the complex adjustments of walking for many months. The occurrence of such reflex adjustments in a baby is related, of course, not only to the stage of growth he has attained, but to the bodily set of the moment. The baby pushes with his feet when "trying to stand up," but not when "trying to sit up."

External stimuli are also, and concurrently, involved in the development of these adjustments. In the case of reaching and grasping, the visual stimuli must be originally effective in arousing internal tensions which also serve as dominant motivating stimuli. Thus activity continues until something happens to alter the original stimulating situation (sight of object). That is, either the object is finally grasped, or the whole activity comes to an end when some other activity is substituted (for example, the rattle is put in the baby's hand, or he is amused with something else).

Other important modes of infant behavior in which visual stimuli are also concerned include the visual exploration of the environment which was so pronounced a feature of Ann's development between her twentieth and forty-first weeks, and the concomitant fingering, rubbing, and general manual exploring of seen surfaces and objects. It seems clear that in the case of these early "exploratory responses" also, the original visual stimuli have, as in the case of grasping, aroused some "state" in the organism which is a basic factor in the situation and serves to prolong the activity until there is some terminating change in the external stimulating situation or the internal state (stimulating situation), or both. There may be interruption from without. Or fatigue will set in —

the baby will finally grow tired of fingering the knobs of the bureau. Or he will stare so long at the different parts of the strange room, or see it so many different times, that he becomes adapted to it. To be effective, we should remember from our general psychology, a stimulus must be novel or stand out in some way from the general sensory environment.

What the baby is feeling or thinking in these varying situations we can never know, although we must assume that the activity is consciously toned. Certainly no child ever remembers these infant impressions, if the author is right in refusing to accept the authenticity of babyhood memories charmed out of "the unconscious" by psychoanalysts. If we apply the term *wish* or *desire* to these strivings it must be with the reservation that the "conscious content" of the moment must be very different from that of adults who are trying deliberately to attain certain ends. The fetal guinea pig, we remember, swam energetically away from the stimulating hand of the experimenter, as far away as the umbilical cord would let it. Was this fetus really consciously trying to *escape*, as a horemic psychologist would be forced by his theory to assume? Can we fix the origin of conscious foresight and effort at any point in the scale of animal evolution, or at any particular point in individual human development? It is certainly present in the child who tells us what he wants, but who can tell when it first appears?

What has become of the theory of instincts as inherited patterns of response? It is clear that the development of any one of these fundamental aspects of growth is a very complex process. It is a process in which such final organization of activity as occurs is based upon native "needs" but also closely related to the kind of environment surrounding the child, his particular structure (whether fat or lean, quick or slow, etc.), and the kind of experiences he has. We are dealing with natively conditioned modes of development, not at all with instincts in the traditional sense; and it seems best to the author as it does probably to most present-day psychologists to give up the use of the old misleading term. To call a mode of behavior an *instinct* implies that it is explained, whereas considerable analysis of the conditions of development is necessary for understanding it. The use of the blanket term *instinct* tends to discourage careful thinking and

to obscure the great complexity of the phenomena dealt with.

Yet, if we redefine the term *instinct* in such a way as to admit of great flexibility, the term may be useful. In any case the adjective *instinctive* is free from most of the objections to the noun, and we might speak of instinctive activities or instinctive modes of adjustment, implying merely that in their development hereditary factors are basic in a sense that does not hold of most activities. But in the author's opinion, the most useful key to understanding what actually takes place in human development is a workable theory of motivation rather than the use of the old concept of instinct with its many misleading connotations. The baby comes into the world equipped with certain fundamental needs and many relatively simple modes of reflex response; but the precise ways of acting by which these needs will be satisfied are not, save for the most elementary and basic activities such as swallowing, definitely fixed by heredity. Man's greater helplessness at birth and his greater flexibility in adjustment constitute his one great superiority over the other animals.²²

SUGGESTIONS FOR READING

Any student would enjoy reading the famous chapter on instinct in the *Principles of Psychology* by William James (Vol. II, chap. 24). Then, after reading the modern critical chapter 16 in Carr's *Psychology*, he will have a good preparation in theory for further reading. . . In G Stanley Hall's *Youth*, a condensation of Hall's famous larger work on *Adolescence*, the student will find almost everything of importance in mental development attributed to instinct. This view, still not uncommon, is in some respects like that of William McDougall. . . Among recent factual studies we recommend Dr. McGraw's *Growth, A Study of Johnny and Jimmy* as a book of great interest, although its sometimes unnecessarily technical jargon will discourage some readers. *The Ape and the Child* by Dr. and Mrs Kellogg is a very readable and unusual book . . . Dr. Mary Shirley's *The First Two Years*, published in three volumes, is both scholarly and readable and, in reflecting without apologies the joy of its author in her task, is reminiscent of Miss Shinn's classic biography.

²² John Fiske, *The Meaning of Infancy*, Houghton Mifflin, 1909.

CHAPTER V

NATIVE FACTORS IN EMOTION AND MOTIVATION

OUR consideration of the growth of Ann and of the development of motor behavior in children in general has brought into the foreground the problem of motivation. Before we analyze motivation as such, however, we shall deal with emotional behavior, which has much in common with motivation, as it has with instinctive behavior as traditionally defined. The terms "instinct," "emotion," and "motivation" are more or less convenient names for different aspects of a type of predominantly non-rational behavior in which native factors are, during the first years of life, very prominent.

EMOTION

Are There Native Emotions?—Traditionally, emotional behavior has been distinguished from the mainly overt sensory-motor activities we discussed in the last chapter. The most popular writer on emotion in the last quarter-century, John B. Watson, maintained that distinction, considering emotion to *be* the visceral and glandular responses to certain stimuli. The author believes that this definition is too narrow to enable us to deal adequately with the complex situations both ordinary people and psychologists have in mind when they think of emotion. The James-Lange conception that emotion is merely the complex of bodily sensations which accompany the internal responses, also seems too narrow. A functional psychologist would prefer a less clear-cut but more realistic and (for him) workable definition such as that of Woodworth, who applies the term "emotion" to the "total stirred-up condition of the organism." This definition would include all responses that occur at the time, whether accompanied by sensations or not. Emotion would include also certain overt components of the total response, such as clenching the fists or curling up the nostrils, or running away or

fighting, and it would always include the basic organic motivating situation.

Whatever definition is held, it is agreed that internal reflex responses are fundamental in emotion, and that they can be aroused by external as well as internal stimuli. We know that they can, moreover, be conditioned in experience. For example, a sudden loud sound is usually an adequate stimulus for the group of starting, trembling, and general internal responses which we call fear responses. Now these fear responses may through individual experience come to be aroused by stimuli which formerly had no effect. A person who has seen revolvers fired off may start violently when he sees one cocked, before the sound actually occurs. Emotional responses in movies are made to such substitute stimuli. For our purposes it is sufficient to recognize that there seem to be certain emotional states and a certain kind of behavior called emotional, which are elicited without learning under certain conditions, and it is important for us to find out if possible what those conditions are.

Watson's Work on Emotions. — In the first edition of this text (1930) the author based her discussion of emotion on an analysis and criticism of the work of Watson, which has been similarly torn to pieces by many other writers. Although the adverse criticism is no longer really necessary, we shall retain most of our early treatment not only because it illustrates so well certain steps in the development of a psychological theory, but also because the Watsonian theory and "facts" are still frequently encountered in popular writing on child psychology. We do not mean to disparage Watson's work, which was a most important, and an exceedingly stimulating, pioneer contribution.

With the help of associates, Watson worked in different ways with more than five hundred infants. All of these were tested in the laboratory, a large number both when newly-born and later at intervals. Others were given special experiments and tests at times demanded by the nature of the problem. There was not, then, absolutely continuous observation of individual infants, but the method was that of controlled experiments on infants whose general psychological history was known, since they had spent their "brief preceding lives" in the Hospital attached to the University.

The first report on this work¹ suggests that there are "three fundamental inherited emotional patterns." These the authors describe as follows, stating for each the native adequate stimuli, and showing how the evidence was obtained:

(1) Fear responses consist of "a sudden catching of the breath, clutching randomly with the hands, the sudden closing of the eyes, and the puckering of the lips followed in some cases by crying." They occurred in response to only two stimulating situations. The first was removal of support. The infant tested was held just above a pillow and allowed to drop suddenly, the blanket upon which it was lying was suddenly pulled, or the infant was given a sudden shake or push. The second adequate stimulus for the fear response was a loud sound, the striking of a steel bar with a hammer being one of the experimental ways of producing this stimulus.

(2) Rage responses consist of a stiffening of the body with slashing movement of the hands and arms, accompanied by crying and then holding of the breath. They were elicited by only one type of stimulating situation, that is, "hampering of the infant's movements."

(3) Love responses, observed only incidentally, were said to involve cessation of crying, smiling, and in older children gurgling, cooing, and finally extension of the arms. These responses were called out by the stimulation of what Watson says may be called the erogenous zones, in rocking, patting, and the like. The authors make no distinction between the stimulation of the sex organs and the stimulation of other sensitive areas such as the lips and the cheeks. Their use of the term "love" has consequently much in common with the Freudian use of the term "sex." Indeed they state that the term embraces all affectionate responses as well as the responses seen in adults between the sexes and that these responses "all have a common origin."

Fear Responses. — Such stimuli as those from furry animals and the dark have long been considered "native stimuli" for fear responses. To put the matter to experimental test, Watson and his associates worked with a special group of six or seven children aged four months to one year. It seems

¹ J. B. Watson and R. Rayner, "Studies in Infant Psychology," *Sci Monthly*, 1921, 13: 493-515.

that none of these babies, who were children of wet nurses in the Hospital, could have developed conditioned fear responses, since "they had never seen an animal or any of the objects which were later presented to them in the laboratory."

Two series of tests were given. In the first, the children were seated in the laboratory, usually in the lap of the mother or a nurse. Live animals were presented separately in various ways — a cat, a pigeon, a rabbit, a white rat, and a dog. The latter was first presented in a room which was nearly dark. The reactions of all the children were positive — they reached for the animals and tried to play with them. Each child was then taken to the dark room and a bonfire was built in front of him. No fear responses occurred. The second part of the testing consisted in taking each child to the zoölogical garden and confronting it with many different animals. Here, too, the responses were positive.

The authors summarize the results in their pioneer article in the *Scientific Monthly* and draw conclusions as follows: "Never in any experiment on any child was the slightest fear response obtained. Almost the invariable mode of behavior was reaching for the object, followed by handling or manipulation. Our results seem to show conclusively that when children are brought up in an extremely sheltered environment, such as never is afforded by the home, fears are not present to other stimuli than those which we have enumerated."

Most authorities agree that the stimulating situations used in this investigation are likely to arouse fear responses. Loud sounds are probably the most common sources of fear reported in the literature. But the implication that all loud sounds produce fear is not supported by careful studies and observations. Pratt, Nelson, and Sun found numerous cases of no response, or "pacifying responses" to loud sounds. Valentine, and other psychological parents as well, have reported absence of fear responses to such stimulating situations as thunder,² and the author's observation of one of her children agrees with these reports. Apparently whether a fear occurs or not is a function not merely of the intensity of the

² K. C. Pratt, A. K. Nelson, and K. H. Sun, *The Behavior of the Newborn Infant*, Ohio State Univ. Press, 1930, chap. iv, C. W. Valentine, "The Innate Bases of Fear," *Ped. Sem. & J. Genet. Psychol.*, 1930, 37: 393-421.

sound but of the kind of sound, and also of the condition of the organism at the time, and of the total behavior situation at the time. A baby in his mother's arms may not fear thunder, but one playing alone may.

Although the reported experience of parents, as well as a number of experiments, lends general support to Watson's conclusions about the relative fearlessness of infants, it is true that he probably failed to notice all the original fear stimuli that are operative even in the first months. In reports on individual infants we find scattered records of fear responses to the visual stimuli involved in sudden movement. It may be argued that sudden movement often occurs along with a noise or mechanical jarring (causing slight "loss of support") so that these responses are really conditioned, but this explanation seems a little far-fetched. One of the author's children at the age of five months showed sudden fear, with violent starting, when her mother got up very suddenly from her chair and approached the crib from the side and top, so that the baby saw her with peripheral vision. There was no noticeable sound at the time. Similar incidents are reported by Jersild.³

Then, too, there seems to be some evidence for the essential correctness of James's statement that fear of strange men and strange animals is instinctive. Babies who react contentedly to any member of the family group are notoriously inhibited or timid in the presence of strangers. A baby may be timid to most strangers but natural and responsive to others who "have a way with babies," that is, who, because of their experience behave toward them in the accustomed ways. This difference is illustrated in the behavior of one of the writer's children on two different occasions. When she was thirteen months old she saw a colored man for the first time. He was unusually tall and large, his face and hands were quite black, and his voice was deeper than any to which she was accustomed. He reached out his hand to the baby and spoke in a friendly way, and she at once responded smilingly, playing with him without a sign of timidity, though with most strangers she was a little timid or at least reserved. When this little girl was twenty-one months

³ A. T. Jersild and F. B. Holmes, *Children's Fears*, Teachers College, Columbia Univ., 1935, Child Dev. Monogr. No. 20

old, an old friend of her father's came to visit the family. Before she was up next morning he had established himself in her father's easy chair, and was reading a magazine. The baby ran in for her usual greeting to her father, but she stopped short just inside the door. Her lower lip went down, and whimpering began, which soon changed to loud crying, although the guest greeted her quietly and in a natural and friendly way.

An explanation might be that in this case, since the child is prepared emotionally and overtly for one type of stimulating situation, when the very different one is suddenly encountered there is a conflict of impulses and the habitual overt modes of response are blocked. Dr. Floyd Allport suggests that "suddenness of the stimulus, or lack of proper somatic adjustment, often causes the impulse to be discharged through the sympathetic efferents," that is, results in internal emotional responses.⁴ We should thus expect timidity or fear to be aroused in a child by any type of object or situation toward which it has no developed habits of response.

The various illustrations of fear of the uncanny or the strange, which have been reported in the literature and are interestingly illustrated in Valentine's account of the fears of his children, would be explained in a similar way. The fear of snakes sometimes observed by Jones in some children over two (but not under two), and fear responses to mechanical toys and the like, belong in the same general category.⁵

If Allport's explanation of fear is correct, and to the writer it seems more reasonable though less simple than Watson's, it is not the modality of the stimulus (whether auditory, tactual, and the like) which primarily determines the fear response, but the manner of its application as well as the nature of the motivating conditions present at the time in the child. Allport considers that it is not only suddenness of the stimulus which results in emotional response, but intensity, repetition, or "insistence," and any blocking of the somatic responses to powerful drives. We may add that fear seems to result from interference with any definitely

⁴ F. H. Allport, *Social Psychology*, Houghton Mifflin, 1924, pp 91-94.

⁵ C. W. Valentine, *op cit* ; M. C. Jones, "A Study of the Emotions of Preschool Children," *School and Society*, 1925, 21 755-758

established set or expectation. Without any opportunity to learn, the baby may respond with emotion to stimulation marked by any of these features. The emotion is called fear or anger or something else, not on the basis of a particular stimulus involved or a particular set of internal responses, but on the basis of the type of overt adjustment which is made — whether, for instance, it is shrinking, struggling, or attacking.

As the baby grows older he may respond emotionally to changes in the sensory environment which formerly did not affect him, because they were not yet differentiated out of the vague complex of sensory situations surrounding the baby at first. As the baby's sensory and motor and neural equipment, still undeveloped at birth, becomes mature through the normal processes of growth, he undoubtedly becomes capable of reacting to a wider range of sensory stimuli, and external changes which formerly simply did not register now become stimuli. Thus with increasing age we have a native basis for more complex emotional behavior.

But although there is a likelihood that after the first months of babyhood there will be more emotional behavior related to native motivation, this does not mean that new native emotional responses will appear, in the sense of instinctive responses to particular stimuli — it simply means that the whole organism, being more complex in sensitivity as well as in responses, is more susceptible to interference or disturbance.

At the same time that the baby grows structurally he is also learning new ideas, new ways of perceiving and naming objects and situations, and all this experience lays him open to more interference with expectations and accustomed ways, hence to more emotion. The fear of the dark which develops in some older children (as in four of Valentine's five children between the ages of two and five years) seems to be related to such modes of perceiving and thinking, in which specific experience plays a part, and is not, therefore, instinctive. The number of definite fear responses that may be called instinctive in responses to particular stimuli, must then remain small. It is important to realize, however, that many late fears, for one reason or another, do develop in a

good many children in the years between one and five, and knowledge of the conditions under which they develop is essential to their control and prevention.⁶

Further research on instinctive fears both in animals and human beings is much needed. The author's own studies of the reactions of young rats to cats has impressed her with the great complexity of the problems. In one group of normal white rats isolated from birth and taken care of by a pet-loving laboratory assistant, fear, when first exposed to a playful or even aggressive cat, was either amusingly absent, or, in the few cases where it appeared, relatively mild. In another group of blinded rats, very healthy and equally well fed and cared for but not petted (since this assistant did not like rats) every animal showed marked fear, with prolonged "paralysis," when exposed to the cat.⁷ Plainly either some effect of the operation, or the general timidity of the animals, was the most important factor in the marked fear. That the organic condition and past experience in either animals or children is an important factor in determining whether fear shall appear is a very reasonable hypothesis. It may well be that in human babies certain fears are really native, but do not usually appear in tenderly-reared children because these are not affected by the organic states which are a condition of their appearance.⁸

We have been discussing fear responses as if we agreed with Watson's description of the "typical pattern" of fear. Actually we do not, but regardless of theory, everyone knows what is meant when we say that an animal or a child "shows fear." The preceding discussion will have suggested that the actual fear response varies greatly from situation to situation. It suggests that the Watsonian theory of emotional patterns in general is also weak.

The Theory of Emotional Patterns. — We cannot agree with the conclusion that there are "three fundamental in-

⁶ M. C. Jones, "The Elimination of Children's Fears," *Jour Exp Psychol*, 1924, 7 383-390, A. T. Jersild, "The Nature and Prevention of Childhood Fears," (In) Jersild and Holmes, *Children's Fears*, part IV, pp 299-350

⁷ M. W. Curti, "Native Fear Responses of White Rats in the Presence of Cats," *Psychol Monogr*, 1935, 46 78-98

⁸ This point is interestingly illustrated in H. S. Jennings' *The Biological Basis of Human Nature*, Norton, 1930, chap 5

herited emotional patterns." There is no evidence in the original report that there occurred any clearly definable set of responses to any of the stimulating situations presented. Instead the overt responses were many, varied, and overlapping. Studies of adults indicate that in what we commonly call anger there are many of the same internal responses that occur in fear, and that some of the overt responses are also the same. Some of the behavior components of surprise, again, are like those of fear or anger.

It is true that in newborn babies there occurs a characteristic set of responses called the Moro reflex or body-startle, which has been extensively studied.⁹ This was essentially the response elicited by Watson by pulling the blanket on which the infant was lying. Dr. McGraw elicited it by a sudden blow of a stick on the mattress. It originally includes a marked and general bodily response with bowing and clutching movements of arms and legs, accompanied by or followed by vigorous crying. It goes through a sequential development in the course of which the amount of general bodily response is reduced until all that is left, in the mature response at about eight months, according to McGraw, is "blinking and a quick, fine body-jerk." This may be called a pattern response but only in a loose general sense, since there is much variation from infant to infant, from situation to situation, and from time to time. What we said about inherited patterning in instinctive behavior applies here also.

The Moro reflex is probably the most definite set of emotional responses of a patterned character to appear in early infancy. Most emotional behavior in that period is so general that, unless the situation causing the behavior is known, it is very difficult to identify the emotion. In a study of emotional expressions in infants as judged from moving pictures by medical students and students of psychology, the Shermans found wide disagreement as to the character of the emotion exhibited. The naming of the emotions was more accurate when the subjects were told with each picture

⁹ O. C. Irwin, "The Amount and Nature of Activities of Newborn Infants Under Constant External Stimulating Conditions during the First Ten Days of Life," *Genet Psychol Monogr.*, 1930, 8: 1-92; see also M. B. McGraw, *Growth*, Appleton-Century, 1935, pp. 45-52; and W. Dennis, "A Psychologic Interpretation of the Persistence of the So-called Moro Reflex," *Am. Jour. Dis. Child.*, 1935, 50: 888-893.

the nature of the stimulus.¹⁰ In older babies Dr. Florence Goodenough found evidence of much more definiteness in the pattern of response, observers being able to name correctly the emotional situation represented in pictures of a ten-months'-old child in about half the cases. This is apparently a case of increasing definiteness of response with increasing age.¹¹ In grown-ups there is a fairly definite startle pattern.¹²

It remains clear, however, that Watson's tentative listing of three emotions as primary on the basis of the type of response involved is not the most useful procedure. Fear, anger, and love appear rather to be useful as rough classifications of all the emotions, not as names of particular emotions, and we may have to use other main heads to include all the significant components of native emotional responses. There seem to be a vast number of possible internal responses, and which will be called out depends primarily on the pattern of the stimulating situation, not upon the existence of any fundamental organized groups of responses which may be distinguished as special primary emotions. To illustrate, the fear responses occurring when escape is impossible and the fear aroused by loss of balance when in ocean water is different from the fear aroused during a thunderstorm. Carr concludes that "it is the behavior-situation that constitutes the primary and distinctive characteristic of an emotion . . . and one emotion is just as primary . . . as another."¹³

Sex Emotion. — A second weakness of the Watsonian interpretation, in the author's view, is the classification of responses to stimulation of the cheeks, chin, and other sensitive areas as sex responses. It seems more reasonable to consider as sex responses only those which arise from stimulation of the sex organs, or responses in the sex organs themselves. Following Allport we might classify separately all positive

¹⁰ M. and I. C. Sherman, "The Differentiation of Emotional Responses in Infants, I Judgments of Responses from Motion Picture Views and from Actual Observation," *Jour. Comp. Psychol.*, 1927, 7: 265-284.

¹¹ F. L. Goodenough, "The Expression of the Emotions in Infancy," *Child Develop.*, 1931, 2: 96-101.

¹² W. A. Hunt and C. Landis, "Studies of the Startle Pattern. I. Introduction; III. Facial Pattern." *Jour. Psychol.*, 1936, 2: 201-205 and 215-219.

¹³ H. A. Carr, *Psychology*, Longmans Green, 1925, p. 281.

responses to stimulation of other sensitive areas, and call them "sensitive zone reactions." The young child then would be said to exhibit very few sex responses, and these would form the chief native basis for love toward parents and others who care for the child. Only with the approach of puberty, according to Allport, would we find many and complex sex responses, and only then could the love of a child for parents include important sexual components. At the same time the emotional sex responses would become conditioned to sensitive zone stimuli, so that now the stimulation of sensitive zones would call out definitely sexual emotions.¹⁴ This theory, although it, too, has its limitations, seems to square with the facts we have better than the Watsonian interpretation does.

Allport's theory is misleading if and in so far as it implies that genuine sex responses of an emotional character do not appear until the approach of puberty. The almost universal occurrence of masturbation in young children, and the reports of adults that handling of the sex organs in childhood was accompanied by definitely sexual emotion, indicate that stimulation of the outer sex organs themselves as well as internal sex stimulation from glandular and other growth changes, may result in sex feeling long before the special growth changes of puberty begin.

There is evidence indeed of a gradual growth of sex organs from the time of birth on, and could we get intelligent and honest reports from large numbers of normal children, we should probably find evidence of corresponding sexual feeling which is only greatly increased, but not initiated *de novo*, at puberty. At this point we should say that intelligent reports from children are in many cases unobtainable, partly because of the policy of secrecy in our society, partly because there is not enough knowledge of the nature of sex behavior or of sex feelings to make it possible to identify them, let alone report them. Much sex feeling even at the time of puberty is probably not recognized for what it is, particularly in girls where such specifically localized responses as erection do not occur. It is also true, of course, that the observation of any kind of internal activity, involving introspection, is peculiarly difficult.

¹⁴ F. H. Allport, *op cit*, pp 67-69

There is, moreover, considerable question as to how much self-analysis growing children and adolescents should be encouraged to employ. We greatly need evidence on sex-development throughout childhood. But there are special difficulties inherent in the use of clinical psychoanalytic introspective methods which were referred to in the first chapter. The author is inclined, therefore, at the present time, to counsel a reliance on observation of the spontaneous activities and speech of individual children, rather than systematic investigation, unless the latter is conducted with adult subjects.

Both the time at which this sex emotion becomes possible and the extent and intensity of its manifestation doubtless vary greatly from individual to individual and also in relation to such factors as health, exercise, and opportunity for other types of emotional expression. Yet it is important to remember that there is evidence not only of some normal sex-functioning from birth onward, but also that the genuine pre-pubertal and pubertal sex changes occur very early in many normal children.

It is Allport's contention that the only native stimuli for sex responses are either contact applied to sex organs, or internal stimuli, the latter connected with physiological processes; and that it is through conditioning or learning that these responses come to be evoked by the mere sight of members of the opposite sex. There is adequate evidence that in mammals of the same general physiological make-up as man, the chief basis of sex behavior is internal, the result of internal growth changes initiated by increased secretion of certain glands.¹⁵ An animal which would normally develop the characteristic male behavior at the time of puberty may be caused to develop female characteristics instead by castration. Animals brought up in isolation from members of the opposite sex develop characteristic adolescent and adult sex behavior at the appropriate time, and will behave overtly in sexual ways toward members of their own sex, or even members of different species, or even sometimes inanimate objects, in case they are not exposed to the opposite sex. Yet if, when an isolated animal has reached sexual maturity, it is exposed to a member of the opposite sex, it will usually respond, with

¹⁵ See a summary by F. A. Moss in chap. 5 of the book, *Comparative Psychology*, edited by him (Prentice-Hall, 1934)

some but not much initial trial and error, with the series of overt sexual acts characteristic of the normal adult of the species.¹⁶

Evidence from clinical studies of normal people, as well as from reports in novels and autobiographies, strongly suggest that the essential situation is the same for human beings as for animals. There are gradually ripening mechanisms for both internal and overt sex responses (and the corresponding feelings) and when these mechanisms are physiologically mature they tend to function, giving rise, along with the stimuli from glandular secretions, to powerful intra-organic stimulation which results in a heightened level of general activity. While in such a state of physiological need (whether recognized as such or not), the individual is particularly responsive to contact stimuli of a certain sort, and hence may respond sexually to any object that will furnish the adequate contact. Such contact, leading to relaxing types of sexual response, may be furnished by other than the biologically desirable objects (members of the opposite sex), hence habits of homosexual or other irregular types of sex-adjustment may develop and constitute (for the individual but not for society) adequate means of satisfaction of the underlying organic tension.

Normally, of course, both animals and human beings will grow up with members of the opposite sex who will furnish the most natural way of making satisfactory sex adjustments. People learn so easily to be sensitive to the wealth of associated stimuli from the opposite sex, that the response to these "artificial" stimuli of clothing, voice, and the like, seems in-born. Long before puberty, moreover, the average boy or girl is so educated by society that the normal responses are the natural ones.

Not infrequently, however, other attitudes and other habits of adjustment develop and the individual is sexually cold, homosexual, or otherwise poorly fitted for the socially normal type of adjustment. In human beings nature does not automatically take care of the whole process as she does in the case of insects. Wise parents will help their children develop the normal attitudes, beginning in the earliest years.

¹⁶ Many of these points are illustrated in the pioneer study by W. Craig, "Male Doves Reared in Isolation," *Four. An. Behav.*, 1914, 4, 121-133.

Sex behavior has powerful instinctive bases and components, but it is very variable and highly subject to modification. It furnishes one of the best illustrations in human life of the unwisdom of the concept of "unerring instinct" and of the need for intelligent analysis and study.

Emotion and Motivation.— This discussion of native factors in sex emotion has also illustrated the impossibility of drawing a sharp line between the internal and the external components of emotional behavior, and of separating the responses themselves from the motivating stimuli that are a condition of their occurrence. The glandular and visceral and other bodily responses that take place under certain conditions are part of the emotion, of the whole "stirred-up condition of the organism." They are also, as we shall show, an important source of motivating stimuli for the maintenance of the emotional activity or for the initiation of other emotional activity. In discussing native factors in emotion we have seen the narrowness of the "response theory" of Watson and some other writers, as we have been forced to make use of the concept of organic motivation in dealing with the material at hand.

MOTIVATION IN RELATION TO HEREDITY AND GROWTH

The Nature of Motivation.— We may, in the words of H. A. Carr, define a motive as "a relatively persistent stimulus that dominates the behavior of an individual until he reacts in such a manner that he is no longer affected by it."¹⁷ Hunger is a clear example. It has been found that sensations of hunger in human beings are the subjective correlates of organic stimuli, arising from the rhythmic muscular contractions of the stomach. These continue with brief intervals, until food is taken, when the contractions cease and the individual, under normal conditions, is no longer hungry. The stimuli involved are persistent; that is, they continue until removed by the adaptive act of eating. And they are dominant; that is, they arouse vigorous and continued responses which prevent the individual from reacting in a thoroughly integrated way, at the same time, to other stimuli. Experimental studies in both animals and human beings have shown

¹⁷ H. A. Carr, *Psychology*, p. 73.

that the periods of greatest general bodily activity are correlated with the occurrence of hunger contractions, and Richards has demonstrated that this holds true in case of the general bodily activity of human infants. He cites evidence which indicates that both the contractions of the stomach muscles and the general bodily activity are responses to chemical changes in the blood¹⁸

During the time in which the motivating stimuli are dominant, others, of course, affect the individual, since he is acting in a wider sensory environment. A hungry baby continues to cry and to move restlessly until he gets milk; but meanwhile he may respond temporarily to many other stimuli — to the voice of the nurse, to the sight of a bright ball dangled before him, to the sudden opening of a door. All of these stimuli affect the nature of the total activity, but they do not constitute motives, for they are merely incidental or transient.

The same thing may be said of many stimuli which merely touch off well automatized complex habits, such as the dinner bell which starts all the boarders to the dining room. Here the motive is hunger, and the bell merely gives a different turn to the directed set of responses already going on. So it is, perhaps, with most of the external stimuli to which people respond during the day — these result in minor responses or touch off trains of activity, which furnish their own motives and distract or check or further activity which is already dominated by a continuing motivating stimulus.

The motivating stimuli may be either internal or external. Examples of internal motivating stimuli are found in hunger and in sex stimulation, the stimuli concerned in a stomach-ache, or the kinæsthetic and other stimuli affecting a child who has sat still too long. Examples of external stimuli which may constitute motives are a loud continuing noise, such as that from a wood saw, a noise which may first elicit cringing and shrinking, and finally movements of escape; or continuous heat or cold leading finally to behavior which changes the stimulus either through modifying it directly

¹⁸ T W Richards, "The Relationship between Bodily and Gastric Activity of Newborn Infants 1 Correlation and Influence of Time Since Feeding 2. Simultaneous Variations in the Bodily and Gastric Activity of Newborn Infants under Long-continued Light Stimulation," *Hum Biol*, 1936, 8 368-386.

(e.g., putting out the fire), through escape, or through providing shelter.

The term "want" or "need" is sometimes used as synonymous with motive, and this usage is consistent with the definition proposed above if these terms are used in a strictly objective sense, as referring to the underlying stimulating situation. Some psychologists use the expressions "tissue need," "urge," or "drive," to refer to the native organic conditions which may dominate the organism. They would restrict the word "motive" to acquired tendencies. The writer sees a disadvantage in maintaining such a distinction. In the first place it is not clear that it is helpful to emphasize a distinction between native and acquired factors in motivation. We shall see that native motives soon become greatly modified, and that motivation is typically very complex, so that in practice it would be very difficult to pick out the strictly native factors in an intricate motivating situation.

In the second place this common theory might imply that while in native motives (tissue needs) there are definite stimuli affecting some part of the body, in acquired motives there is likely to be merely some vague general "line of action." Now the great merit of the definition proposed by Carr is that for the vague notion of "consistent lines of action," as applied to learned motives, it substitutes the clear-cut hypothesis that acquired as well as native motives involve a persistent stimulus. This conception is widely applicable. We can apply the hypothesis that a motive is a stimulating situation even though we have to include as stimuli conditions which exert their effect directly, and not by way of receptor-neural-effector circuits. For example, a chemical substance in the blood may perhaps act directly on skeletal muscles to alter their tonus. Or a total situation (e.g., amount of activity) prevailing in the cortex of the cerebrum at any time may possibly influence the character of thinking without first affecting definite receptors. Certainly we know that the physiological condition of neurones, whether they are under pressure for instance, or at an unusual temperature, influences the passage of the neural impulse.

It seems likely that motives usually constitute physico-chemical forces which in human beings commonly act through definite sensory channels. But whether they always do or

not, it is helpful to think of motives as stimuli, defining a stimulus as any force which exerts a direct effect upon the activity of the organism, either through sensory channels or by acting directly upon body tissues. This definition would include the conditions or tissue needs which dominate the behavior of animals without nervous systems. We would say, for example, that the "food-seeking" behavior of an amoeba is a series of responses to an organic motive. It would also include any neural conditions which may be found to initiate and maintain activity and any chemical substances which continue to act directly in such a way as to dominate the behavior of the individual for an appreciable time. Recent studies by physiologists suggest mechanisms and concepts through which we can better understand "the rôle of intrinsic physico-chemical dynamics of groups of cells in maintaining certain behavioral response patterns independently of the external environment."¹⁹

According to our conception, to say that a motive is satisfied means simply that something happens which changes the stimulating situation so that it no longer dominates the individual. The means of satisfying a given motive may be legion. All the hungry infant does is to cry and keep on crying. When he has learned to creep, and has become used to being fed in the dining room, he will probably, when hungry, creep to the dining room; and only if the food is still lacking will he then cry. When he has learned to speak, he may call out for the food, and later he will ask politely for it. He will learn to sit at a table, to use his knife and fork, and to chew his food properly. Older people learn to plant grain, to gather and store fruits and vegetables, and to cook meat, and all these habits are different ways of satisfying the hunger motive.

Classes of Motives.—At the beginning of life the infant's behavior is dominated by comparatively few and simple motives. By the end of the second year, however, the average child shows an intentness and stubbornness in carrying on certain lines of activity, so that his actions are often unpredictable and embarrassing to the parents, and testify to the emergence of strong personal "interests" other than

¹⁹ See Hudson Hoagland, *Pacemakers in Relation to Aspects of Behavior*, Macmillan, 1935

those involved in hunger, thirst, and the like. With the years these interests multiply indefinitely, and when the new physiological stimuli of puberty enter in to complicate the situation, the motives which may be aroused and function in any one personality are so numerous, so tangled, and so hard to get at, that many parents give up in despair.

We may gain help in understanding the intricacy of motivation by considering first what the child has to start with in the way of motives; and then the classes of motives which arise from the modification of native motives and the acquisition of new ones.

Native Motives. — Certain physiological “states” incident to the normal functioning of the organism are innate and can be counted on as more or less important factors, according to the circumstances of his life, in the behavior of every human being. Most of these are operative at or soon after birth. They include the internal stimulating conditions involved in hunger, thirst, defecation and urination, sex (appearing in full strength at puberty), internal pain or pressure, lack of air, fatigue (a need for rest), drowsiness, and restlessness or the need for action.

As a result of experimental study we know fairly definitely just what are the internal stimuli and what are the receptors involved in some of these motives, such as hunger. In most of them, however, the precise stimuli have not been isolated, but we do know that each corresponds to a definite condition of organs or tissues, and that these tissues are richly supplied with sensory nerve-endings and more or less specialized receptors. Hence it is reasonable to suppose that the organic conditions may often exert their influence on behavior as stimuli acting through regular sensory channels. The varying metabolic changes in the tissues must involve, for example, extensive chemical stimulation. Varying degrees of contraction or relaxation in muscles provide stimulation of a kinæsthetic type. The pressure of undigested food, of waste matter and gases, and the accumulation of liquids in containing sacs would afford continuing mechanical stimulation. But, as we have said, the direct action of chemical substances upon tissues, without neural transmission, must constitute an important source of motivating stimuli.

Among native internal motives we must include the physio-

logical state which persists after a native emotional response has occurred. We have seen that native emotional response-complexes consist largely of internal reactions. There may be changes in tonus of smooth or visceral muscle. This kind of muscle contracts much more slowly than skeletal muscle, and may remain for a longer time in a contracted state. Experiments by Cannon and others have shown, moreover, that the cessation of digestive activities, which is a characteristic response in emotion, may be of long duration. The peristaltic movements in the stomach may be absent, and the food may lie undigested for many hours. There is evidence also that one type of reflex response in emotion consists in the liberation of glandular secretions into the blood. These substances may augment and prolong certain effects already produced by the reflex effects of the exciting stimulus.²⁰ Thus we have convincing experimental evidence that, even without prolongation due to learning, the physiological effects of a strong emotion may be lasting enough to dominate behavior for a time, and hence to constitute a motive.

Besides the native internal motives we have listed, certain external stimulating situations will, in the absence of any opportunity to learn, dominate at times the behavior of an individual subjected to them. These include intense light, extremes of temperature, continuing loud sounds — in fact, any stimulation which is intense enough to be biologically harmful. Besides intensity, external stimuli may have other characteristics which cause them to dominate behavior. For example, a person's activity may be dominated by faint sounds gradually increasing or decreasing in intensity, or by objects moving slowly across the field of vision; and it may well be that it is because of the native organization of the individual that stimuli presented in this manner are dominant.

Acquired Motives. — All native motives, even after the first few weeks of life, become greatly complicated by acquired factors. They are changed and supplemented both through sensory-motor learning and by ideational activity.

From early infancy conditioning is important in widening the range of stimuli which may dominate the child's activity. To illustrate, it is at first only a certain internal "physiolog-

²⁰ W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear, and Rage*, Appleton, 1915

ical state" which causes the infant to be active and playful. But after he has become accustomed to romping with his mother or father, and later with other children, the mere presence of one of these others will serve as a strong stimulus to activity, even if the child is really tired and would naturally rest or sleep. For the original intraorganic stimulus a new external stimulus has been substituted. Moreover, this external stimulus, setting up new activities, may result in changing again the physiological condition so that the child's "need for action" is prolonged. In the case of hunger the mere sight or smell of a favorite article of food or of the dish in which it is served, or the sight of other people eating, may set up the same responses that natively would be set up only by actual hunger pangs. The child who begs for food is not always activated by physiological hunger.

Inorganic motives which give rise to negative responses also become attached to external stimuli. The smell and sight of violets came to elicit nausea in one young girl, as the result of a hospital experience when she lay sick for days, with a bowl of violets near her bed. Now she cannot bear to have them in the room.

As applied to emotions, change in motivation by conditioning is exceedingly important. The positive emotional behavior at first elicited only by "bodily well-being" — food, warmth, patting, and the like — very soon is aroused strongly by the sight or voice or touch of those closely associated with the well-being; and the resulting organic states may just as definitely dominate behavior as if they had been aroused by the original stimuli. In this process we have the basis for those attachments to members of the family which are often dominant throughout childhood, and sometimes throughout life. Similarly, anger responses or general withdrawing responses, with their organic aftermaths, may come to be elicited by the people or things connected with the original restraint or pain or other emotion-producing stimuli; so that this sort of conditioning lays the basis in childhood for all sorts of fears, aversions, and resentments.

In all this conditioning of tissue needs or of emotional states, the possibilities of complication are greatly increased when the child learns to use words. Through verbal conditioning he may, under social tuition, acquire abiding emo-

tional "sets" toward an enormous range of stimuli. He may come to like or dislike certain sounds, sights, or colors, so that his æsthetic appreciation is affected; he may become prejudiced in favor of or against certain theories, according as they are associated with people he loves or with strangers, with familiar ways or strange ways, with a good income or a poor one, he may in various ways learn to hate or to love people he has never seen, in a part of the world which he will never visit; all this because words may take the place of actual situations in arousing emotional responses. How conditioning operates in the modification of behavior will be discussed in a later chapter.

The little child's equipment of native motives begins soon to be supplemented, also, by an ever-widening stock of complex sensory-motor habits. These at first are acquired in the manner to be described in the chapters on learning, as solutions of problematic situations. For example, the baby learns to climb up or down the stairs at mealtime, as the case may be, "to get to the dining room." But once this complex series of coördinations is in process of being established, it becomes interesting, or acquires stimulating power, in itself. The baby who has for the first time just succeeded in getting to the bottom of the stairs may immediately clamber up again and repeat the descent; and he may do this again and again until he is tired. Later the mere sight of the stairs, at any time of the day, is likely to be followed by an attempted climb. As he learns to do other complex things—to dust the furniture in his nursery, to climb the little ladder outdoors, to pedal his tricycle along the sidewalk—the small child develops for each of these activities a marked degree of interest. He is apt to resent help, and his whole behavior is likely to be marked by an intent persistency which is at the same time a source of amusement to the attending adult, and the despair of anyone who tries to get him to do anything else before he is ready to stop.

As he grows older the child shows less intense interest in the things which he has learned to do well; but at any time he may become absorbed either in a different way of performing an old activity or in learning an entirely new one. And in general, throughout the rest of his life, the individual will tend to be "drawn to" those modes of activity which are ha-

bitual to him. James says it is this "force of habit" which permits the work of the world to go on, in that it keeps people content with the lowly and even disagreeable or dangerous walks of life to which they have been since early years accustomed.

It is clear that somehow these acquired ways of action motivate conduct. One is tempted to say that in each case the real motive is the original one which underlay the learning of the habit, and that the habit itself furnishes a mere secondary stimulus to activity. This is a common view among psychologists. It leads not only to search for the basic primary or native motives, but to strong emphasis on their importance. For this reason the leading physiological motives of hunger and sex are sometimes considered the central bases of human conduct.

On the other hand, when one considers the complexity and the almost unlimited number of activities which may become basic in behavior, and the great tenacity with which almost any of them may come to be pursued, not in childhood alone but throughout life, one sees the force of Carr's contention that these "acquired motives" are just as important functionally as the native organic motive. Woodworth has insisted that any activity performed in satisfaction of a drive may itself create a new drive which thereafter operates without any present relation to the original one, so that the subject is interested in the new activity on its own account. He also dwells on the point that any activity for which an individual is specially fitted is likely to be performed with spontaneity and zest, and to furnish its own drive. This functional doctrine of motivation has recently received fresh support from G. W. Allport, who has christened it "the doctrine of the functional autonomy of motives."²¹

The functional theory of motivation seems to be a better explanation of the absorbing interests of children than what we may call the "original springs doctrine." The only difficulty with it, from the point of view of our definition of motive, is that of explaining what constitutes the stimulating situation in an acquired motive. We can observe that, in the case of a particular subject, when the time comes for the performance

²¹ H. A. Carr, *op cit*, pp 389 f.; R. S. Woodworth, *Dynamic Psychology*, Columbia Univ. Press, 1916; G. W. Allport, *Personality*, 191-207

of an habitual act, or when the subject is confronted by the stimuli which usually touch it off, he is, if prevented from going on with the activity, restless and moody until it is performed. A two-year-old child, for example, is used to having a bath, with its attendant delights of splashing and drying and patting, just before her supper each day. If, instead, she is taken into the bathroom and merely has her face and hands washed, marked restlessness may ensue, with attempts to get into the tub. At supper there may be a tendency to throw the spoon to the floor and to eat the cereal somewhat rebelliously.

What are the actual dominant stimuli in such a case? We may assume that because of the previous practice in going through a certain routine, the child is at a certain time "all set" for her bath, that is, there is an actual internal stimulating situation, including a certain state of tonicity of muscles, condition of certain organs and the like—in other words a total "physiological state" which tends to elicit the movements of taking the bath. The sight of the tub and the sound of the water reinforce these stimuli. Hence both the internal "set" and the outer releasing stimuli enter into the motivating situation. Or, even in the absence of the internal stimuli, the outer ones may, on the principle of conditioning, arouse the same responses. Thus, although even invitations to supper sometimes failed to induce the child willingly to leave her exciting play in the sandpile, she would leave at once, even well before the usual time for her bath, at the first request, "Come, take your bath, child!" Saying to herself, "Take baf, shile!" she would trot eagerly into the house and upstairs.

Whatever the correct physiological explanation may prove to be, it does seem clearly true that learned habits may function in some way as powerful drives. If this be true, there is no good reason for laying more emphasis on native motives than on these. Presumably, a motive is psychologically "real," that is, important as a factor in human personality, to the extent to which it is strong and dominates behavior, not simply because of its origin.

Acquired motives may in fact become stronger than those which are clearly native. We need only reflect on such common events as suicides, or on the deeds of martyrs and heroes

in all ages, to realize this fact. Even in early childhood acquired motives of all sorts become strong, and by the time a child reaches maturity his behavior is undoubtedly far less dependent upon organic motives found in any animal, than it is on acquired interests, aversions, and purposes which are characteristic of civilized human beings. In other words, individual experience through which the child acquires and supplements the experience of the race is more important in his personal motivation than biological inheritance.

Just as native motivation is changed and supplemented through sensory-motor habits, so of course is it modified through ideas and thinking. Ideas as well as present stimuli may take the place of the original motive in dominating activity, or, as in the case of emotions, may arouse the original motive. Often an idea is merely part of a total motivating stimulus. Again a whole system of ideas, a "habit of thought" which has been acquired by an individual, may function as a motive in exactly the same way as may a learned sensory-motor habit. The terms impulse, desire, purpose, sentiment, and volition all represent aspects or forms of motivation in which ideas play a role.

There is not much ideation, not much thinking, in impulsive activity — the mere occurrence in thought of the idea of an attractive object results in appropriate activity — and the toddler starts for the pantry. The expression "desire," and its variants, "hope," "longing," and the like, implies some delay and some real thinking. When a definite intention or plan of action is formed we use the term purpose. When a plan of action is preceded by a conflict among desires or purposes, with weighing of the consequences, we say that the plan of action adopted is a volition.

The more thoughtful types of motivation all begin to function in the early years of childhood. But since volitional activity must wait upon the acquisition by the child of enough knowledge of his world to make foresight of different consequences possible, it develops more slowly than the others. We shall understand these ideational factors in motivation better after considering in later chapters the origin and development of meanings in the child, and we may come back to them still later in discussing ethical and social development. Meanwhile, we should remember that although in-

instinctive, organic, and subconscious motivation is exceedingly important in explaining the behavior of children (and of grown-ups) so is the more ideational type of motivation.

Characteristics of Motives.—Two important general characteristics of motives as they actually operate in children (or adults) may be better understood in the light of the foregoing discussion of the main classes of motives. In the first place, except in the infant who has not yet learned to use symbols or ideas, motives are characteristically complex. Even the simplest physiological motives, such as hunger or pain, will in their domination of behavior act along with specific ideas, desires, plans, intentions, or volitions, according to the nature of the situation and the experience of the child. The complexity in motivating conditions we should expect to increase, in an individual child, in proportion to the extent of his experience.

In the second place, it is clear that in most motivating situations, quite possibly in all, there must be some unconscious or only dimly conscious factors. Any stimuli may elicit behavior without corresponding sensations being present, and this probably holds true particularly of the kinæsthetic and organic stimuli so important in internal motivation. Even when there are sensations they are likely to be vague and unlocalized, so that the subject finds it hard to describe them. Unless he is highly trained in introspection he may find it impossible to tell their source unless the stimulation is intense. The existence of actual hunger contractions may lead to restlessness and inattentiveness in a schoolboy some time before he becomes aware that he is hungry. Similarly, unusually excited and elated behavior may be due to internal sex stimulation, not recognized as such by the boy or girl. Adolescent restlessness, giggling, and general "excitability" are in part the result of sex motivation unconsciously operating.

Even when ideas or purposes become a part of a motivating stimulus they may operate subconsciously, as we shall explain in a later chapter. A decision may thus seem the only clear and right one to make on the basis of evidence at hand, when in reality it represents a response to a dominant preconceived idea which is, through its reinstated symbolic responses, subconsciously motivating the thought. For example, a boy away at school writes home that he must have more

money—the food is so poor at his boarding house that he must eat at the Club for the sake of his health. Although the significant motivating stimulus is not the poor food but the desire to be with certain other boys, the student may be quite sincere in his analysis.

Little children learn only slowly, through much social experience, effectively to conceal their real motives from others. It seems to be still later that they learn to conceal from themselves some motives of which once they might have been aware. This means that they gradually learn the responses approved by society in certain types of situations, so that these are the responses which most easily occur. If other more unworthy ones appear they are ignored or indignantly repudiated, or they may never appear as conscious ideas at all.

CONCLUSION

Our analysis in this chapter of the native factors in emotion and motivation leads to the conclusion that such native factors, though likely to be present as aspects of behavior during most of the child's waking life, are not in any sense the sole or even the basic or the most important "causal factors" in his life, once the period of earliest babyhood is past. Even the "vegetative activity" of the first year is modified by the changed motivation brought about by habits, new emotional attachments, and the dawn of thinking. And with the varied developments of the next few years, especially the widening of the child's world of interests through his use of and understanding of language, native motivation more and more assumes a secondary though necessary place. The child, if his chief organic needs are regularly and adequately satisfied, is free from their dominance, able to expand in activity and interests, to develop a rich personality. If, however, basic organic needs are not adequately satisfied, they may become of pervasive importance. The underprivileged child, badly nourished, cold, needing more rest, more sunshine, or more sleep, needing dental or medical care, is not free to drink in the delights of this world, to build his life on eager interests, in the sense that such a child as Ann is free. We cannot say for all children that organic motivation or any other type is or is not the most important or the most basic.

Neither can we assume that if the organic needs are adequately met, the child will develop rich and abiding motives of other sorts. There are ways of dulling interests, there are means of restricting the development of the child, which are employed, though not with that intent, in the best families and in the best schools and in the most civilized countries. After we have dealt, in the next chapter, with the ways in which mental abilities grow, we shall take up in some detail the rôle of learning in satisfying the many needs of the growing child, and in creating new ones.

SUGGESTIONS FOR READING

Children's Fears by Jersild and Holmes is an excellent factual study containing good suggestions for prevention. Goodenough's *Anger in Young Children* (Univ. Minn. Press, 1931) is a valuable book. R. W. Washburn has published "A Study of the Smiling and Laughing of Infants in the First Year of Life." *Genet. Psychol. Monogr.*, 1929, vol. 6, 397-537. . . . Mary Cover Jones presents a survey of the chief factual studies on emotion with a bibliography in chapter six of the *Handbook of Child Psychology* (1933). . . . Experimental studies of physiological motivation in children are scarce. Very suggestive studies of muscular tension as related to emotional motivation in children have been made by Elizabeth Duffy. See her monograph "Tensions and Emotional Factors in Reaction," *Genet. Psychol. Monogr.*, 1930, vol. 7, 1-79. . . . Of particular interest to teachers is Prescott's *Emotion and the Educative Process* (1938). Chapters II and III of this book deal with hereditary and physiological factors in emotional motivation.

The most important readings on the topic of motivation are, in the author's opinion, contained in such articles and monographs as are cited in the footnotes. In the book *Animal Motivation* by Warden and associates one finds examples of experimental studies on animals which have important implications for child training (particularly the studies on segregation and sex behavior).

References on incentives in learning and on the rôle of emotion and motivation in social behavior and the development of personality will be given in later chapters.

CHAPTER VI

THE DISTRIBUTION AND DEVELOPMENT OF PARTICULAR MENTAL CAPACITIES

EVERYONE knows that children differ greatly in such physical traits as height, shape of features, and color of eyes and skin. These differences we usually unhesitatingly attribute to heredity, although we recognize that in some of them environmental factors may cause great changes. In chapters two and three we saw that the fundamental modes of overt adjustment in human beings develop gradually, during prenatal and early postnatal life, and that not only their general course of development but the time at which the various main stages in development occur in individual children, seem to be determined quite definitely by hereditary factors, in coöperation, of course, with normal environmental factors. There are, we saw, very wide individual differences in the time of appearance of sitting, creeping and walking, and in the time of onset of pubescence.

In this chapter we shall deal with the rôle of heredity in modes of adjustment, abilities or "traits" which may be distinguished from such physical traits as height, such specific physiological developments as pubescence, and such modes of adjustment as sitting and walking, in that they involve more implicit behavior (more adjustment that cannot be observed by other people) or more conscious activity. These traits may be called, loosely, mental traits, although we must remember that there is no sharp separation between mental and physical activity, and also that the expression mental activity is more inclusive than the expression conscious activity. The word traits will be used in this chapter in the loose general sense of characteristics or abilities of the organism, not in the technical sense employed in the chapter on personality. In the next chapter we shall continue our treatment of mental development by discussing general intelligence.

We saw that while Ann was "learning" to reach and grasp, to sit up and creep and walk, she was also developing steadily

in ability to remember things, to talk, to deal with colors, to sing and draw and make things out of blocks. Finally, she was developing that ability to adapt to new situations which parents call brightness and psychologists call general intelligence. In all these abilities Ann differs from other children, as she did in time of walking and in style of walking and in other motor "traits".

To what extent are such individual differences due to differences in hereditary equipment, and to what extent are they conditioned by differences in opportunity, in training, in environment? Before attempting to deal with this question we may well ask why it should be considered at all. Often a theoretical assumption concerning the resistance of hereditary factors to change is back of it. Some psychologists say, as most people are inclined to say, that what is inborn can not be changed, that we must not hope to alter radically any trait primarily determined by heredity.¹ Is this true, and if so is the converse true, that trait-differences of environmental origin are peculiarly subject to change?

In this chapter we cannot deal at length with any particular individual differences in mental traits, but we can suggest their extent and importance, and discuss the probable rôle of heredity in their determination. We shall also deal with the general course and rate of mental growth during childhood, in so far as it is revealed in tests of particular abilities or traits.

It is through the attempt to measure and compare the abilities of men that we have achieved even the small degree of knowledge that we now possess. A consideration of some of the problems and methods in measurement is therefore an essential basis for our treatment.

THE MEASUREMENT OF MENTAL ABILITIES

Are Physical Measures Indicative of Mental Abilities?

Many mental abilities obviously depend to a greater or less extent upon the growth of physical structures. Is observed physical growth an index of mental growth? A child who has long legs may be able to run faster than a shorter com-

¹ Cyril Burt, *The Young Delinquent*, Appleton, 1925

panion of the same age. Long fingers are an asset in piano-playing, and small hands in some kinds of petty thieving.

One important type of mental condition has been shown to be associated with a type of inherited physical structure. Idiocy and certain kinds of mental defectiveness are related to special types of defective brain, and in some cases the skull is characteristically enlarged (in macrocephaly) or abnormally small (in microcephaly). It was at one time thought, when phrenology was in vogue, that many complex traits such as acquisitiveness and honesty as well as intelligence, were directly related to the size of certain parts of the brain and to corresponding contours of the skull, and that phrenologists could judge abilities and give advice as to careers on the basis of an examination of the head. Such a procedure, we know now, has no scientific justification. But in popular lore today, and in even our best literature, we have still the belief in the "weak chin," the "far-set, clear-seeing eye," and the "lofty brow of the scholar."

The psychologist, however, has shown that there is no good basis for such beliefs.² He has also discovered that although on the average bright children tend to be somewhat taller and better developed physically at all ages than dull children, the relationship is slight. It is also clear that there is slight if any relationship between early pubescence and intelligence. Hence we cannot judge intellectual development by physical development.³ The number of "mental abilities" in which measurable or even observable physical features are prominent is small indeed. We must then use indirect means for estimating the importance of organic maturation as a factor in mental growth.

Tests of Particular Mental Abilities.—If we apply to large numbers of children of different ages and different circumstances tests which involve material familiar to them all, in which all of them can achieve something, and in which the coöperation and interest of all can be secured, then we have taken a step toward mental measurement. We need tests

² D. G. Paterson, *Physique and Intellect*, Century, 1930.

³ For example, see the article by C. P. Stone and R. G. Barker, "On the Relationships between Menarcheal Age and Certain Aspects of Personality, Intelligence and Physique in College Women," *Ped Sem & J Genet Psychol*, 1934, 45:121-135; also, M. E. Abernethy, "Relationships between Mental and Physical Growth," *Monogr. Soc. Res. Child Develop*, 1936, 1, No. 7.

which will enable us to say that consistent differences in performance from age to age are related to increase in native ability, or that consistent differences among individuals are related to differences in native ability.

It is not easy, however, to devise tests even of simple mental functions which will elicit full cooperation and be relatively independent of training. The author once attempted to measure differences in sensory discrimination, among other abilities, by applying individually, to 90 extremely dull children and 110 extremely bright children aged six to 15 years, tests for discriminating shades of gray, judging the middle of lines, and judging differences in lifted weights.⁴ In the shades-of-gray test, 16 small gray cards with white handles were to be arranged in order from white to black, after a preliminary demonstration with reference to a card showing a correctly arranged model series. Wide individual differences were shown both in accuracy and in time taken to arrange the cards. Bright children did better than the dull, on the average, at each age. The average for each age group was higher than for the preceding age, for both bright and dull children, so that attractive looking "curves of growth" could be plotted, the curve for bright children rising at a slower rate because initial ability was greater.

In giving the shades-of-gray test the author was struck by the greater ease and quickness with which the instructions were understood by the older children and by the brighter children, and also by the greater interest and "pep" of the brighter subjects. These were subjective judgments, but they suggested forcibly to the author that she was not merely, getting at "sensory discrimination" but also, and perhaps mainly, at intelligence. A general factor of speed might theoretically have been the main ability tapped, since speed was suggested by the conduct of the test, and was a factor in understanding the directions. Other studies have shown that the ability to discriminate among such a series of grays is subject to marked improvement if names for the different shades are learned. In such a simple test as this one then, many factors are involved — one cannot easily get at "native ability."

⁴ Margaret Wooster (Mrs M. W. Curti), "An Experimental Study of Bright and Dull Children," 1915, unpublished thesis in the library of the University of Nebraska

Suppose, to take another example, we wish to test the growth of memory in children. We may show to each of a number of children of a given age a card of colored squares, and see how many colors they can name after it is taken away; or repeat to them series of digits of different lengths, to see how long a series can be repeated correctly. Ability to reproduce would obviously demand a knowledge of the colors and the digits, and hence would not be a fair test for very young children, or primitive children who do not use many color names or many numbers. Even normal children of the proper age might differ in test performance because of differences of interest in the materials rather than of memory.

We might use nonsense syllables equally unfamiliar to all children, such as zab, gek, and the like, in order to obviate differences in familiarity and interest. But even here some children might differ markedly, not because of differences in memory capacity but because some are used to being tested and feel at ease in the test situation, while others do not. This is one of the main reasons why tests of primitive people should be interpreted very cautiously if the aim is to investigate "racial," meaning innate, differences in ability. Obviously no test of this sort would do for deaf children or those with special difficulties of speech.

Not only would the materials of the test, the ability of the children to deal with it, and the general familiarity with the test situation influence the result, but the mode of administration would be important. If it is to be a valid measure of individual differences, it should be given under good conditions, and in just the same way to all the children tested. Moreover, if the child is to do his best he must feel at ease in the presence of the examiner. A stranger, a person of very different speech or manners; an apparently cold or too objective or unsympathetic person, or any person of a different race, may get apparent coöperation and apparently reliable results, but one can never be sure of the reliability, even if the child responds about the same on later tests. Even in the case of a simple ability like memory for digits all of these factors should be kept in mind.

We might try to deal with the factor of interest by giving meaningful words to repeat, rather than digits or nonsense syllables. People do learn meaningful material more easily.

But the moment you use more complex materials you leave more room for the influence of learning and familiarity.⁵

Since differences in training may account for individual differences in a given ability, one way of dealing with this factor would be to subject all the individuals to be compared in that ability to sufficient special training to bring each up to the level of his ability. Presumably, then, differences still remaining would be due to genetic differences. Various studies have shown that such physiological limits for many basic abilities exist, but the labor involved in training is such that this procedure has not been used in many studies of individual differences. To apply it to measurements of the same function at each age throughout childhood would be, with our present resources, a very difficult undertaking.

In general, however, it may be said that when a group of children of the same age is subjected to special training in any particular simple mental function, such as tapping with a stylus, naming colors, or repeating digits, they all make improved scores, but individual differences persist, and on the whole the rank of a child in the group tends to remain about the same, although there are various minor changes and some strikingly large changes in rank of particular children.⁶

We must conclude, therefore, that it is possible to devise tests which measure (roughly, to be sure, but better than mere observation can measure) stable mental characteristics or abilities in children. But to what extent these relatively stable abilities are based on hereditary growth factors, and to what extent on environmental factors, is seen to be a question difficult to answer. We shall be able better to deal with it after we have considered some findings about the distribution and development of certain abilities.

In any case, as psychologists we are interested in consistent differences in abilities between individuals, however they are caused, and may profitably employ tests to study their distribution, their rate of development, and their susceptibility to training, irrespective of the extent to which heredity deter-

⁵ See A. B. Blankenship, "Memory Span A Review of the Literature," *Psychol. Bull.*, 1938, 35, 1-25.

⁶ M. Kincaid, "A Study of Individual Differences in Learning," *Psychol. Rev.*, 1925, 32, 34-53; J. Peterson and M. C. Barlow, "The Effects of Practice on Individual Differences," *27th Yrbk. Natl. Soc. Stud. Educ.*, 1928, Pt. 2, 211-230.

mines them. We may also, using such techniques as co-twin control or others to be discussed later, employ tests as a means of research in the field of mental heredity. We shall be better able to conduct such studies, or to interpret studies made by others, if we keep in mind certain rules or principles of interpretation.

It is clear that if we are to compare an individual with the average, we must, if we wish to get as close to "native ability" as possible, test a large number of children of a homogeneous group, not selected in any way, and we must realize that the average score in the ability is average for that general social grouping, in that particular culture, not for children in general.

We should also realize that we are actually measuring, not an abstract something (sensory discrimination, memory, quickness of reaction, intelligence, or some other entity), but the ability to perform some definite task. Hence if we present a curve showing average performance in a test of memory for nonsense syllables at various ages, we should not label it "development of memory in children," or even "development of rote memory," but "average score in reproduction of nonsense syllables at different years," or something similar.

Finally we should always realize that we are testing, not inherited traits, but traits in which both heredity and environment are important in varying degrees. We may, as we shall see, make inferences as to the general importance of heredity in a particular trait, but without intensive study we cannot say how important heredity may be in determining the individual differences involved.

We are not necessarily limited, however, to the discussion of definite tasks only, because through critical use of test results we are justified in making larger inferences. In the case of memory tests, it has been shown that there is a tendency for children who do well in one type of memory test to do well in another memory test.

The degree of relationship between performance of the same group of children in two different tasks can be stated mathematically by a *coefficient of correlation*, a term with which every student of psychology should be able to deal.

If the child who is best in task A is best in task B, and the one who is second best in A is second in B, and so on, the

poorest in task A being poorest in task B, then we have a perfect positive correlation, expressed as 1.00. If the relationship is high but not perfect, we will have a correlation over .50 at least, let us say, or approaching 1.00. If there is little relationship, the correlation will be less, but statistical analysis may show it to be reliable; that is, of some predictive value. If there is no relationship between scores on the two tasks, and presumably between the abilities involved, the correlation will be zero. If the relation is negative, the correlation will be somewhere between zero and -1.00. A correlation of -1.00 means that there is complete antithesis between the abilities. By the use of a simple formula the degree of relationship between two series of measurements can easily be determined.⁷

Applying the correlation method, then, to carefully gathered data, it has been shown that scores on different types of memory tests are related, although the degree of relationship is sometimes slight, and varies with the materials in the test, method of administration, homogeneity of the group, and age of the subjects. Various investigators have found a correlation between scores on memory tests and intelligence, and this relationship appears to be stronger in the earlier years. But even when the effect of scores on intelligence tests is eliminated (which can be done by suitable statistical treatment), a significant though often low correlation is found between some memory tests and others. For example, after making such an allowance Bryan found a correlation of +.42 for 200 five-year-olds between their scores on a test of picture-recognition and a test of memory for colored forms.⁸

The statistical methods by which psychologists seek to establish the existence of a common factor in varying tests are too complex to go into at this point, and there is still disagreement among psychologists as to the importance of some of them. The fact remains, however, that significant relationships among varying test performances do clearly exist. The memory tests, then, are "tapping" some more general

⁷ H. E. Garrett, *Statistics in Psychology and Education*, Longmans Green, 1926, chap. 4, 149-163, 189-195

⁸ A. I. Bryan, *Organization of Memory in Young Children*, Arch. of Psychol., 1934, No. 162. For a general statement see F. N. Freeman, *Mental Tests*, Houghton Mifflin, 1926, 127-128.

ability that affects test performance. We may call this capacity "memory," although we know that we are not measuring memory directly, but only performances related to it, whatever it is.

That there are other groupings of abilities in children as in adults is indicated by recent investigations. There appear to be such things as general motor ability,⁹ quickness of response,¹⁰ mechanical ability,¹¹ and other larger categories of mental life, to name only a few of the general traits or abilities in the growth of which hereditary or maturational factors seem to be of basic importance.

None of the larger abilities we have mentioned, such as memory, constitute separate faculties or divisions of the mind. They are merely names for overlapping groups of functions or abilities which are more related to one another than they are to other abilities in the individual, and hence may conveniently be discussed, at times, under a common name. The analysis of such general groupings of ability in people has not gone far enough to enable us to speak with great confidence of their distribution in individuals and their growth during childhood. We are usually safer at present in sticking to more concrete abilities about which more is known.

THE DISTRIBUTION AND DEVELOPMENT OF PARTICULAR MENTAL TRAITS OR ABILITIES

In the case of almost any simple mental-test ability we may select, we find, if we test a large number of individuals of a given age, that there is a wide range of performance, even if the group has had about the same general environment. This statement is illustrated in Figure 9 which shows curves of distribution for the single physical trait height and for a number of "simple mental abilities" in children. It is seen that the general form of the distribution of the mental abilities is about the same as for height. The irregularity of some of the curves we may suppose is due to the nature of

⁹ See F. L. Goodenough and R. C. Smart, "Inter-Relationships of Motor Abilities in Young Children," *Child Develop.*, 1935, 6 141-153

¹⁰ C. E. Dowd, *A Study of the Consistency of Rate of Work*, Arch. of Psychol., 1926, No. 13

¹¹ J. W. Cox, *Manual Skill, Its Organization and Development*, Cambridge Univ. Press, 1934

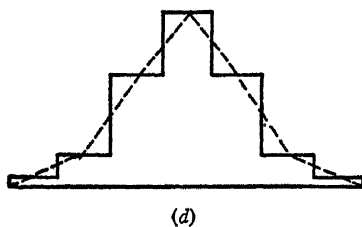
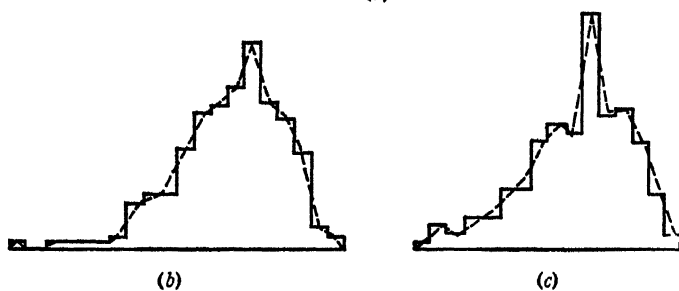
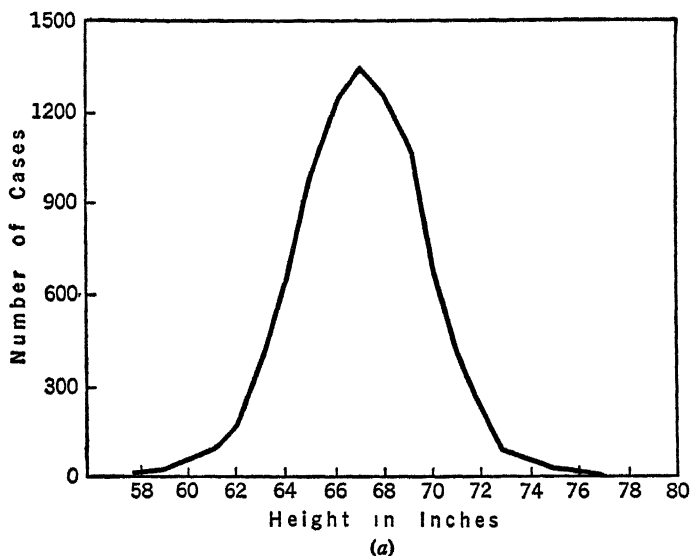


FIG. 9. TYPICAL DISTRIBUTIONS FOR HEIGHT AND FOR SIMPLE MENTAL ABILITIES

The distribution for height (a) from Yule, *Introduction to the Theory of Statistics*. Distributions for mental abilities from Thorndike, *Educational Psychology*, Vol. III. Reproduced by permission.

- (a) Height in inches 8585 adult English-born males (Yule)
- (b) Reaction time 252 college students (Thorndike)
- (c) Drawing lines 153 girls age 13 to 16 years (Thorndike)
- (d) Memory of digits: 123 women students (Thorndike)

the test, the small number of cases, or other minor factors, because when in similar studies larger numbers are tested, and the test is so constructed that all the subjects are capable of doing something with it and none is capable of perfect scores, we do get a relatively smooth distribution.

This sort of distribution is called the "normal distribution." The fact that where we have good tests of a basic ability applied to large numbers of people of a homogeneous group we are likely to get a curve of this sort, is very signifi-

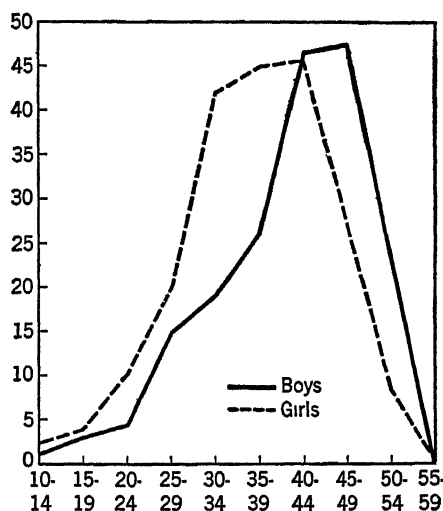


FIG. 10. DISTRIBUTION OF SCORES OF BOYS AND GIRLS
ON A TEST OF ARITHMETICAL REASONING
(Data from Schiller)

Anastasi, *Differential Psychology*. (By permission of Macmillan.)

cant for psychology. It suggests that we are likely to find not a few distinct types, but many gradations of the same ability, with most people clustering about the average, and many more at varying distances from the average. This point we shall return to again in discussing general intelligence.

When we think of abilities as distributed in the form of a curve, whether the distribution be "normal" or not, we are impressed by the error of considering averages alone in judging differences between groups. There may often be a defi-

nite difference between groups in some ability *on the average*, but the overlapping of the group may be so great that it is clearly not fair to judge individuals on the basis of this average difference. A study of Figure 10 will make this point clearer, and the point needs emphasis since the failure to consider it is one of the most common popular fallacies in judging people.

The existence of such large differences in mental abilities among children is a challenge to the psychologist and to the educator. Such differences are among the most important of the foundations of personality, to use Gordon Allport's felicitous phrase: they are, with other types of difference, what makes a child an individual. We therefore wish to find out all we can about them and the factors in their development. Only a book, in fact a large number of books, could give an adequate treatment of the subject — and there is still a crying need for research in the field.¹²

Unfortunately the emphasis on norms and standards and general trends in the field of measurement in the last twenty or thirty years has led to a neglect of the consideration of individual deviations from the norms and trends. The norms are essential. To say that a particular child can do such and so much in a given task will not help us greatly in deciding what he needs unless we know how other children of the same age do in the same task. But neither will averages alone help us much, beyond giving a general comprehension of causes and tendencies. We need the *total distribution* in order adequately to deal with our problem.

We need also to know, in the case of any particular mental ability in which we are interested, how that ability grows in individual children from year to year, not merely what is the average growth, for it is important to know how and when the rate of growth may deviate in particular children, and when it does, whether particular conditions are associated with the deviations. Such questions cannot be answered by the study of average growth only.

¹² The following are interesting treatments of the subject E. L. Thorndike, *Educational Psychology*, Vol. III, Pt. 2, "Individual Differences and Their Causes"; F. S. Freeman, *Individual Differences The Nature and Causes of Variation in Intelligence and Special Ability*, Holt, 1934; A. Anastasi, *Differential Psychology*, Macmillan, 1937.

Some psychologists, realizing the importance of this point, have been conducting long time studies of individual growth,¹³ but published results so far have dealt largely with physical growth and with the growth of general intelligence, rather than with the particular abilities which are just now the subject of our attention. Data on some of the sub-tests in these "intelligence tests" make some contribution to our knowledge of the development of particular abilities, but it is a limited one since they have not been designed as comprehensive measures of those abilities. Besides, some of the traits we are particularly interested in, such as those basic in æsthetic appreciation and in social adaptability, are not particularly related to general intelligence and not likely to be tapped in intelligence testing. Careful studies of the development of a particular ability in the same individuals from year to year over the entire age-range are rare and hence we must as yet depend for most of our data on studies measuring the ability in different groups at the different ages.

In this chapter we can do no more than to suggest the character of the results already obtained and the general trends indicated, by presenting and interpreting some of the findings on the development of certain abilities which have received study. We shall take for our illustrations the growth of reaction time and of ability to sing.

The Development of Reactive Capacity. — Dr. Florence Goodenough used the Miles reaction board in testing children and adults. This is an apparatus connected with an electrically controlled clock in such a way that when an auditory stimulus is given the clock starts, and when a telegraph key is pressed down by the subject it stops. The time between stimulus and response, in thousandths of a second, or milliseconds, can be read off on the clock face. The subject is instructed, with his hand on the key, to stop the clock as soon as possible.

¹³ These include studies of mental and physical growth of school children conducted under the direction of W. F. Dearborn at the Psycho-Educational Clinic, Harvard University (to be published as a whole soon) and those reported in B. T. Baldwin, *The Physical Growth of Children from Birth to Maturity*, Univ of Iowa Stud in Child Welfare, 1921, No 1; also the studies of growth and development conducted by F N Freeman and associates at the University of Chicago, and by H R Stolz and H E. Jones and associates at the Institute of Child Welfare, University of California.

In Goodenough's study 10 reactions were taken for each hand. The median time (i.e. the middle one of all the reaction times arranged in order from low to high) was taken as the score for the individual child. Care was taken to maintain motivation but preliminary practice does not seem to have been given. The test thus given showed low positive correlations with tests of speed in walking, tapping, needle

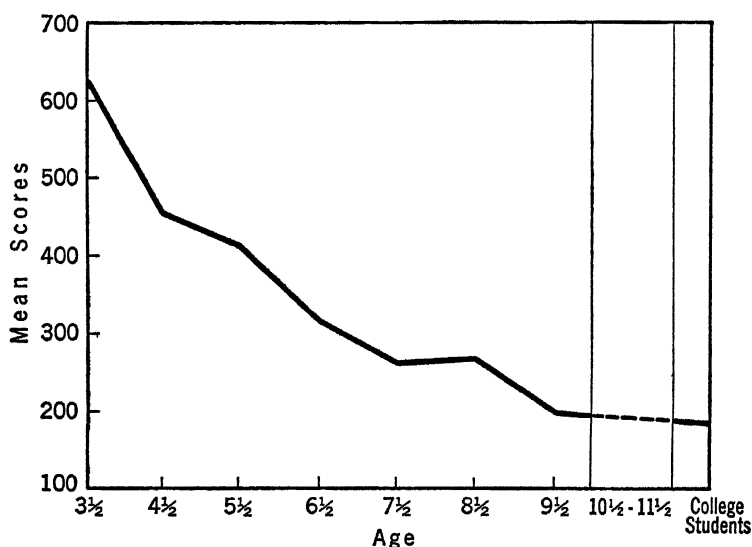


FIG. II. REACTION TIME OF GIRLS FROM CHILDHOOD TO MATURITY
Based on data from Goodenough, "The Development of the Reactive Process from Early Childhood to Maturity," *Jour. Exper. Psychol.*, 1935, 18, 4. Goodenough reports only combined data for boys and girls at year 10½-11½ owing to the small number of cases.

threading and the like, therefore it cannot be said to be, in itself, a good test of quickness of response in general. We shall speak then of the development of "reactive capacity" only in the sense of ability to perform this particular test or others very much like it.

Goodenough gave the Miles test to 246 children ranging from two and a half to eleven and a half years and to 56 college students.¹⁴ Figure 11 shows graphically the increase in

¹⁴ F. L. Goodenough, "The Development of the Reactive Process from Childhood to Maturity," *Jour. Exp. Psychol.*, 1935, 18 431-450

average speed in girls from year three and a half to year nine and a half, and in college students.

Similar decrease, with age, of reaction time to both sound and touch has been reported by the author (Curti) in experiments with 104 bright and 83 dull children. A standard Hipp chronoscope was employed, preliminary practice given, and every attention paid to getting *en rapport* with the subjects and maintaining good motivation. Bright children did consistently better on the whole than the dull children.¹⁵ The fact that decrease in reaction time with increasing age during childhood would be shown if the same individuals were tested at succeeding years is indicated by a study of Harold E. Jones. For five years he gave repeated tests, using a technique similar to that of Miles, to a group consisting at first of 100 boys and 100 girls of the fifth grade.¹⁶ The average gain in reaction to sound over a three-year period was slight and irregular, probably because there was a wide spread of ages at each testing. When records were examined of 15 boys and 20 girls whose ages did not vary more than two months from the average age of the whole group, decrease was shown, as indicated in the following table:

TABLE I. REACTION-TIME MEANS IN SUCCESSIVE TESTINGS
FOR 15 BOYS AND 20 GIRLS*

| Date | Boys | | Girls | |
|-------------|------|-------|-------|-------|
| | Mean | S. D. | Mean | S. D. |
| Spring 1933 | 173 | 16 | 189 | 38 |
| Fall 1933 | 152 | 18 | 156 | 28 |
| Fall 1934 | 155 | 21 | 157 | 20 |
| Fall 1935 | 152 | 18 | 151 | 18 |
| Fall 1936 | 152 | 18 | 143 | 19 |

* From "Reaction-Time and Motor Development," by H. E. Jones, *Amer. Jour. Psychol.*, 1937, 50: 181-194, by permission

¹⁵ Margaret Wooster (Mrs. M. W. Curti), *op cit.*

¹⁶ H. E. Jones, "Reaction-Time and Motor Development," *Amer. Jour. Psychol.*, 1937, 50: 181-194.

There is a question whether the gains shown in the table were due to practice or adaptation in the successive tests, and not to basic growth in the ability. As a check on this hypothesis Jones tested a control group of 50 tenth-grade pupils matched in age, grade, and sex with a representative sample of the main group. An average reaction time of 162 milliseconds for both boys and girls was obtained, which was slower than the main group (this averaged about 150). This indicates that practice and adaptation, not sheer increase in ability, was a factor in the development of the main groups. When, however, Jones compared groups of widely different ages which had been tested by the same general methods, clear evidence of marked and consistent gains with age was disclosed, as shown in the following table:

TABLE II. REACTION-TIME AS A FUNCTION OF AGE*

| <i>(Right hand, both sexes)</i> | | |
|---|-------------|------------|
| <i>Sample</i> | <i>Mean</i> | <i>S D</i> |
| Berkeley Infant Growth Study (37 cases ; age 4 5 yr) | 398 3 | 78 3 |
| Nursery school 'alumni' (34 cases , age range, 5 yr ; mean age, 7 3 yr.) | 250 8 | 73 3 |
| Adolescent group (76 cases , age range, 2 3 yr. ; mean age, 10.9 yr.) | 186.7 | 25 0 |
| Control group (50 cases ; age range, 2.0 yr ; mean age, 14.7 yr) | 162.5 | 18.3 |
| College students (40 cases ; mean age, 19 5 yr) | 156 7 | 23.3 |

* From Jones, "Reaction-Time and Motor Development," p. 189 By permission

Although understanding of directions, adaptation, and other factors must have entered into the gain shown in this table, its magnitude and consistency can be accounted for only by assuming underlying maturational development of some sort.

The reader will have noticed in the tables a slight sex difference in speed in favor of the boys. The same slight difference is shown in other reaction time studies, including the one by the author. In the latter study bright girls were on the average significantly slower than bright boys, and

dull girls than dull boys, in reaction both to sound and to touch, at every age from six to 13, except in three comparisons where the exceptional results seem related to special factors such as smallness of the number tested. This sex difference is too small to consider in judging individual boys and girls. Moreover it is one of the few consistent sex differences found in particular mental abilities which in general are present in the same degree in both sexes.¹⁷

According to Goodenough there is not only a decrease in reaction time with age: there is also a decrease in general bodily tension and in non-essential general bodily movements, and also less variability in the reaction times at the later years of childhood. This may be due, as Goodenough has suggested, to the existence in the early years of a state of "diffused nervous excitation during which the child is truly unable to make the single integrated movement," but to the author it seems more likely due to the general lack of familiarity of the young child with such situations, as well as to the way in which these particular tests were given.

These selected studies of reaction time afford clear evidence for a growth during childhood of basic capacity and a maturing of that capacity somewhere near the general terminus of physical development. But they also show clearly that it is no easy matter—in fact that it is impossible—to measure even such a simple basic "native" ability accurately. Jones urges the importance of considering factors in the particular test situation. "Although this is designated a test of 'simple reaction time,'" he says, "the functions involved are far from simple. Individual differences in performance are unquestionably influenced not merely by basic factors in the latent time of neuro-muscular mechanisms, but also by emotional factors, by competitive attitudes, and by many specific aspects of the subject-experimenter relationship."

In addition to the factors mentioned by Jones we realize of course that ability in this task is related to the ordinary factors involved in all growth—to nutrition, health, exer-

¹⁷ F. L. Goodenough, "The Consistency of Sex Differences in Mental Traits at Various Ages," *Psych Rev*, 1927, 34: 440-462. See also, for a later review of the literature on this subject, B. L. Wellman, "Sex Differences," (In) *A Handbook of Child Psychology*, Carl Murchison, ed., Clark Univ. Press, 1933, 626-649.

cise, and the like. It is also related to training and adaptation to test situations in general. Mental measurement even of the simplest functions is indeed a complicated matter.

The Development of Ability to Sing.—Children's ability to sing is an ability of great significance, if we consider æsthetic development important. It is also closely related to the ability to discriminate pitch which psychologists have assumed to be especially free from environmental influence.

Professor C. E. Seashore, the great pioneer in the measurement of musical ability, devised a group of fundamental tests¹⁸ including a test of pitch discrimination which he believed was an accurate measure of native ability to discriminate pitch. A large number of pairs of tones of different pitches are exposed at a regular rate by means of a standard phonograph record (tuning forks were used in the early testing), and after a preliminary demonstration the subject records for each pair whether the last tone sounded is higher or lower than the first. The total number of correct answers is the score on the test. Regarding this test, Seashore wrote in 1910: "Pitch discrimination is an inborn capacity which reveals itself in full force without special training."

In support of this position Seashore cited an experiment by H. S. Buffum, who after a preliminary test of only 15 minutes, using tuning forks, divided 25 eighth-grade pupils into three groups according to accuracy in the test. He trained these pupils in 20 periods of 40 minutes each (a long training period), taking records of right and wrong judgments. In spite of all this work there was not the slightest evidence of improvement at the end of the period. The average score was the same as at the beginning. Only two children had changed groups and of these one had been on the border-line and the other, it was found, had failed to understand the preliminary test. On the basis of such results Seashore repeated tentative directions for applying the results of testing school children which he had published years before. The expression "vd" refers to the number of vibration differences the child can accurately discriminate.

¹⁸ C. E. Seashore, *Psychology of Musical Talent*, Silver, Burdett, 1919, see also, by the same author, *A Survey of Musical Talent in the Public Schools*, Univ. of Iowa Stud. in Child Welfare, 1920, No. 2

"Children are entitled to know the facts thus learned," Seashore said, urging that such knowledge might be of untold value "especially (1) to those children who are in danger of having a musical education forced upon them, although physically incapable of hearing music in the true sense; and (2) to those children who first discover in this test their natural ability. . ." ¹⁹

Before making a final judgment about the susceptibility of pitch discrimination to training, let us consider a few of the studies of pitch discrimination and ability to sing which have appeared since Seashore wrote the above.

The wide distribution of the ability to sing among normal children is illustrated in a study by A. T. Jersild and Sylvia F. Bienstock, ²⁰ who gave tests of vocal reproduction of pitch to 407 children aged two to ten years and to 65 adults. The number of tones in the C major scale which a subject could correctly reproduce constituted his score on the test. Table III indicates a wide variation at all ages in this ability, with great overlapping. Several children at the age of five reproduced as many tones as the average adult. The spread of scores for age six illustrates the essential "normality" as well as the wide spread of all the distributions.

When the average score at each age is calculated and plotted we get the curve shown in Figure 12, which suggests a steady progress in the ability from year to year. If we considered only the table of averages and this curve we should be likely to get a false picture of age differences in the ability. On a practical level, we might be led to expect far less of young children than they are capable of.

Does an individual child maintain his rank in pitch discrimination in an unselected group from year to year? These data do not give the answer, since different children were used at each age. From what we know about such tests, we should be inclined to answer that probably on the whole the ranks would be roughly the same, but that a number of shifts could be expected, some perhaps very large. Direct tests of pitch-discrimination along with other abilities (the Seashore tests of musical ability) were given by Hazel Stanton and

¹⁹ C. E. Seashore, "The Measurement of Pitch Discrimination. A Preliminary Report," *Psychol. Monogr.*, 1910, 13 21-60

²⁰ A. T. Jersild and S. F. Bienstock, "A Study of the Development of Children's Ability to Sing," *J. Educ. Psychol.*, 1934, 25 481-503

TABLE III. DISTRIBUTION OF THE SCORES IN REPRODUCTION OF TONES OF ALL SUBJECTS * AT VARIOUS AGE LEVELS †

| Number of Tones Sung | | | | | | | | | | |
|----------------------|-------|--------|--------|--------|-------|-------|--------|-------|---------|--------|
| | 2 yrs | 3 yrs. | 4 yrs. | 5 yrs. | 6 yrs | 7 yrs | 8 yrs. | 9 yrs | 10 yrs. | Adults |
| 32 | | | | | | | 1 | | | |
| 31 | | | | | | | 1 | | | |
| 30 | | | | | | | | | | |
| 29 | | | | | | | 1 | 1 | 1 | |
| 28 | | | | | | | | 1 | | |
| 27 | | | | | | | 1 | | 2 | |
| 26 | | | | | | | 1 | 1 | | |
| 25 | | | | | | | 2 | | 1 | 2 |
| 24 | | | | | | | 2 | 1 | | 1 |
| 23 | | | | | | | 1 | | | 2 |
| 22 | | 1 | | | | | 2 | | | 9 |
| 21 | | | | | | | 1 | 2 | 1 | 9 |
| 20 | | | | | | | 1 | | 2 | 8 |
| 19 | | | 1 | 3 | 2 | | 2 | 2 | 4 | 7 |
| 18 | | | 2 | 2 | 5 | 4 | 6 | 5 | 4 | 8 |
| 17 | 1 | 2 | 1 | 1 | 4 | 3 | 7 | 4 | 5 | 8 |
| 16 | | 1 | 1 | 5 | 2 | 2 | 4 | 6 | 7 | |
| 15 | | | 3 | 3 | 5 | 4 | 5 | 3 | 4 | 3 |
| 14 | | | 4 | | 1 | 7 | 7 | 1 | 4 | 2 |
| 13 | 2 | 2 | 1 | 1 | 3 | 5 | 2 | 3 | 2 | 1 |
| 12 | | | 3 | 2 | 5 | 3 | 2 | | 5 | |
| 11 | 1 | 2 | 3 | 6 | 2 | 4 | 3 | 1 | | |
| 10 | 2 | 1 | 5 | 1 | 1 | 7 | 4 | 1 | 2 | |
| 9 | 2 | 3 | 4 | 4 | 3 | 2 | 1 | 2 | 3 | |
| 8 | | 1 | 4 | 2 | 4 | 3 | 2 | | | |
| 7 | | 1 | 2 | 7 | 1 | 1 | 2 | | | |
| 6 | 5 | 5 | 6 | 3 | 1 | | 2 | | 1 | |
| 5 | 2 | 3 | 2 | 4 | 3 | | 2 | | | |
| 4 | 3 | 5 | 4 | 3 | 1 | | 1 | | | |
| 3 | | 5 | 1 | 1 | | | | | | |
| 2 | 6 | 5 | 1 | 3 | | | | | | |
| 1 | 3 | 2 | | | | | 1 | | | |
| 0 | 3 | 1 | | | | | | | | |

Age 2 yrs 3 yrs. 4 yrs. 5 yrs. 6 yrs 7 yrs 8 yrs. 9 yrs 10 yrs. Adults

N 30 43 45 52 52 52 52 37 44 63

* Table shows number of subjects at each age reproducing a given number of tones

† From A. T. Jersild and S F Bienstock, "A Study of the Development of Children's Ability to Sing," *J Educ Psychol*, 1934, 25 481-503 By permission.

- Below 3 vd. May become a musician,
 3-8 vd. : Should have a plain musical education (singing
 in school may be obligatory),
 9-17 vd Should have a plain musical education only if
 special inclination for some kind of music
 is shown (singing in school should be op-
 tional),
 18 and above Should have nothing to do with music.

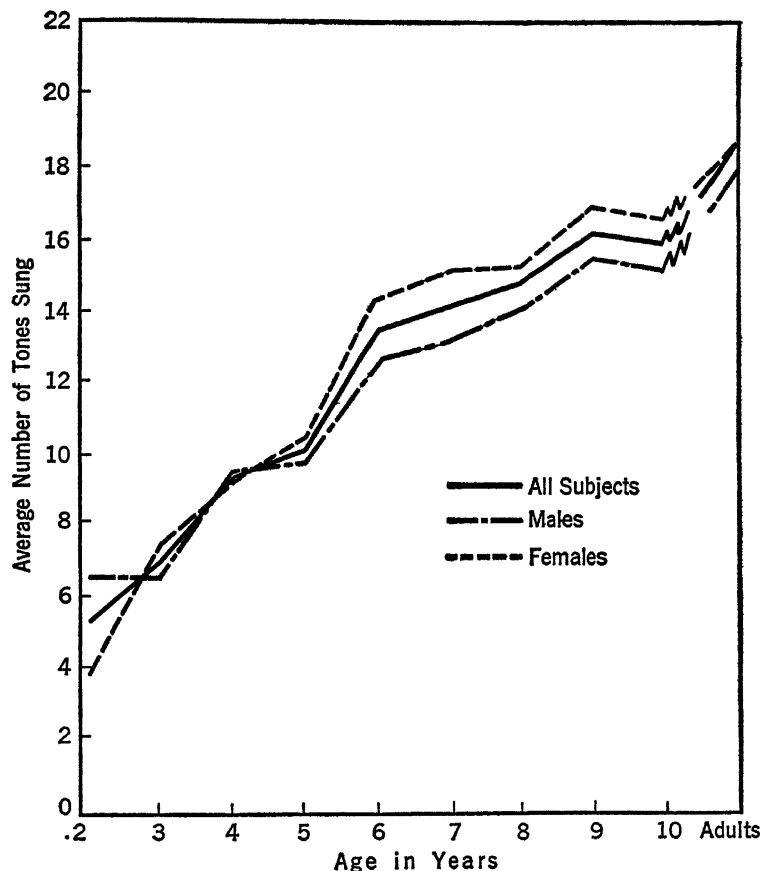


FIG. 12. AVERAGE NUMBER OF TONES SUNG BY BOYS AND GIRLS AT DIFFERENT AGE LEVELS AND BY ADULTS

From Jersild and Bienstock, "A Study of the Development of Children's Ability to Sing," *Jour. Educ. Psychol.*, 1934, 25. Reproduced by permission.

Wilhelmine Koerth to the same children at average intervals of three years. In the group tested twice there were 645 children, and 148 were tested three times. Results indicated in general a rather small amount of shifting in the pitch discrimination test. When the children at each age interval (preadolescent, adolescent, and postadolescent) were divided into five groups on the basis of performance, it was found that they tended strongly to remain in the same groups at the end of the three or six years' time. This study also illustrates the characteristic wide distribution of scores at each age, along with an average increase with age.²¹

Going back to the study of Jersild and Bienstock, what causes the increase in ability from year to year? What causes the changes that take place in the relative ability of an individual child? It seems indeed to be the rule that, in the case of most measurable developing mental abilities, a consistent average increase in accomplishment is found from year to year, despite a wide range at each year. This suggests that there is a definite basis in organic growth for this increase. Curves illustrating this point are shown in Figure 13. They are based on the study by the author (Curti) of certain test abilities of 80 children of very superior intelligence and 75 very dull children as measured by the Stanford-Binet scale. Although there were no more than ten children in any one age-group, for each curve the steady rise in average performance is striking—and typical of results gathered by other methods, on other groups. But granting that there is the same underlying causal factor for the increase in performance with age, may not that factor be simply experience, or education in the broad sense of the term? We must grant at once that experience must be one factor in the increase, but several considerations force us to conclude that a basic factor is maturation or increase in native ability due to the growth of structures (presumably chiefly neural).

For one thing there is the fact that individual children, after practice in a function, have been found to be capable of no further increase in performance, but, tested at later years, do show increases in performance. Again, there is the tend-

²¹ H. M. Stanton and W. Koerth, *Musical Capacity Measures of Children Re-tested after Musical Training*, Univ. of Iowa Stud., Series on Aims and Progress of Research, 1933, No. 42.

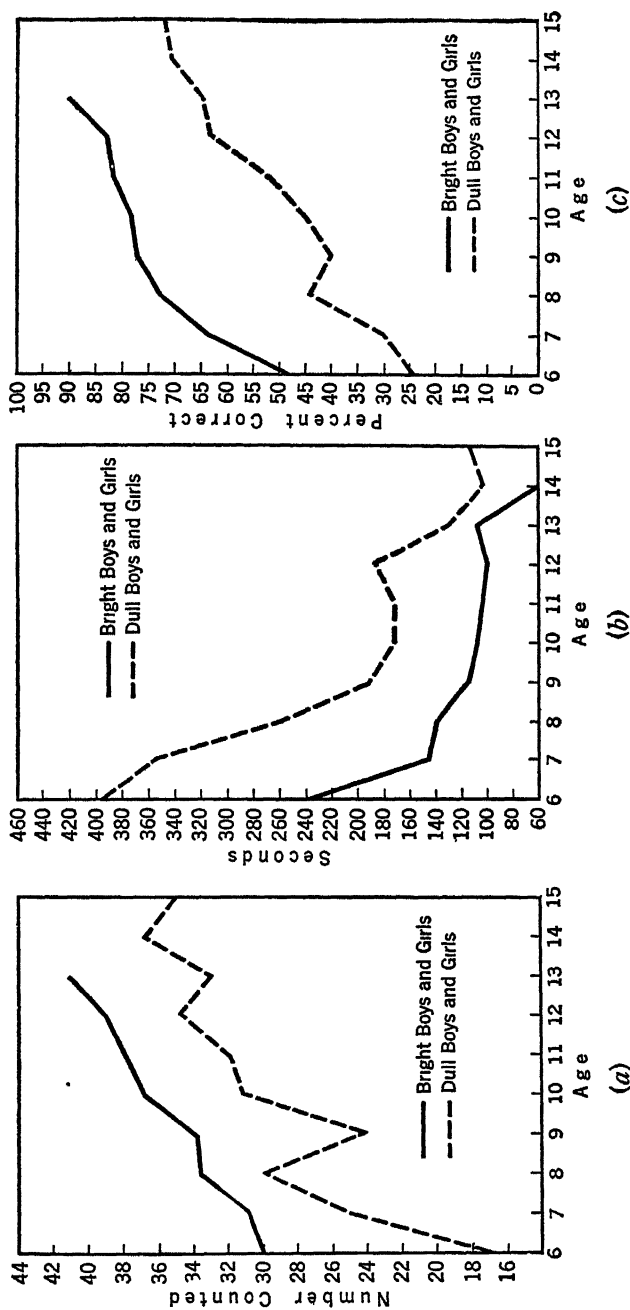


FIG. 13. CURVES SHOWING INCREASE IN "MENTAL ABILITIES" WITH AGE

Data based on the author's "Experimental Study of Bright and Dull Children," 1915. (Unpublished thesis.)
 (a) Counting aloud, 10 seconds (b) Number of seconds required for stringing kindergarten beads
 (c) Scores on memory tests for colors and letter squares (combined scores)

ency to constancy of individual differences in performance. Joseph Peterson wrote (in 1928), "Results . . . show convincingly that in various kinds of learning and for both children and adults and both feeble-minded and superior individuals, the relations between initial and final ability or between ability at any other two measured stages are positive and generally rather high." In other words, individual children tend to maintain their rank with respect to other children of their age, though the ability of *all* increases with age.

Finally there is the fact that at about the time physical maturity is reached, or not far after that time, the curves of performance in some typical mental tasks tend to flatten out. No longer is there steady increase. This point is illustrated by the curves in Figure 14. Now we could argue that a curve for progress in such an ability as adding numbers would flatten out, naturally, as soon as a "child" left school and instruction or practice ceased; and other curves might flatten out simply because the nature of the task makes progress impossible — as for example a curve of progress in naming colors. But such arguments do not hold for the ability to repeat a series of digits said without rhythm at the rate of about one per second. The average five-year-old repeats about four, the average nine-year-old seven, and the average adult repeats perhaps nine. But no adults can go beyond, let us say, fifteen (the number depends on the method used).²² Why not? Clearly because there is a physiological limit of growth for auditory memory span. And so for many other abilities.

We may conclude, then, that nature does have a hand in the growth of basic "simple" mental abilities, and a guiding hand. But, in this development, environmental factors (opportunity, experience, training, motivation) are obviously important. Study after study has shown that almost any ability we can test, even the simplest, such as memory span, improves under practice, or, especially, improves when adequate motivation is provided — interest in the task, a desire to improve, a belief in the possibility of improvement, and above all a measure of self-confidence. Sometimes improvement is made possible, or aided, by remedial physical or

²² A. B. Blankenship, "Memory Span . . .", *Psychol Bull.*, 35, 1-25.

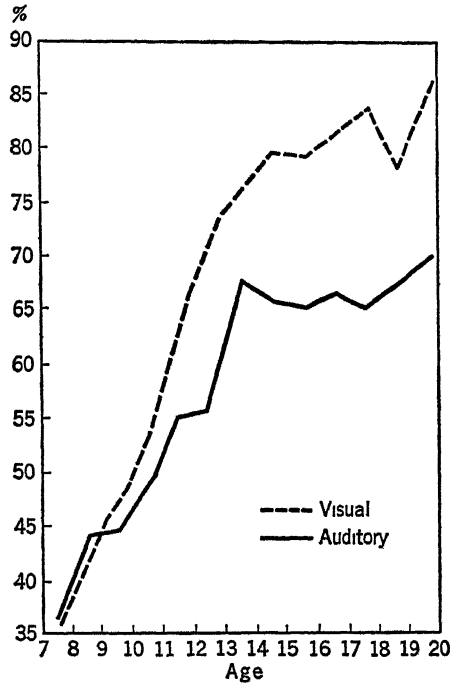


FIG. 14. INCREASE WITH AGE OF SCORES ON TESTS OF VISUAL AND AUDITORY ROTE MEMORY

From Smedley, *Report of the Department of Child Study*, Chicago Public Schools, 1902.

health measures—the provision of glasses, the correction of physical deformity, or the improvement of general health, or by administering special medicines, such as insulin, vitamin preparations, or thyroid in some form. All of these special factors, as well as the usual type of practice, or special training, should be considered where an effort is to be made to improve the performance of a particular child in a particular type of operation—or, for that matter, to improve his “general mental ability.”

Let us apply our generalization about susceptibility to improvement to the ability to sing. As a part of their larger study Jersild and Bienstock report the results of experiments to determine the effect of training on this ability. Thirty-

six children aged 31 to 48 months were divided into two groups, matched as closely as possible with respect to singing scores and age. Special training involving 40 practice periods of about ten minutes each, and extending over a six-months' period, was then given to half the group while the other half received no such training. At the end of the period both groups were retested, and several months later, in the fall, were given a second retest. The trained children made large gains, adding to their repertoire many new notes above and below their "natural range." The tests given in the fall showed that the trained children still retained a marked superiority. In the case of another group of 23 children similarly trained, it was possible to retest 12 after an interval of two years, and these children still gave evidence of a significant retention of the effects of training. More work is needed, but this study alone is eloquent testimony to the possibility of improving a particular ability through special training.

Under the author's direction a musically trained student, Mrs. C. V. Hudgins, studied progress in the reproduction of tones in a group of children, some of whom were underprivileged, in the Preschool Play Group of Smith College. These were tested by the Jersild and Bienstock method and retested later in the year after training. Great gains were shown, especially in some individuals, in number of tones reproduced. Esther McGinnis showed that young children's ability to discriminate pitch has been underestimated. She gave the regular Seashore test for pitch discrimination (as well as the tests for intensity and consonance) to 16 children aged 41 to 59 months. By giving the test in parts and providing for special motivation she got very good scores from the children, nine of them making records comparable to Seashore's norms for fifth-grade children.²³

But the most striking demonstration of the erroneousness of a prevalent view of the resistance of this ability to practice, was given by Manuel Wolner and W. H. Pyle, who gave special, patient individual training to seven children who were the poorest in pitch discrimination of all the chil-

²³ E. McGinnis, "Seashore's Measures of Musical Ability Applied to Children of Preschool Age," *Amer Jour Psychol*, 1928, 40 620-623

dren in three Detroit public schools.²⁴ Not one of these children could sing, although they were in the fifth, sixth and seventh grades in school and had been in the regular music classes since the first grade. They could not distinguish half or whole tones, or even fifths and thirds, nor could they distinguish thirty vibration differences on a set of tuning forks. They were given an average of 16 hours' training, 20 minutes a day on school days, covering a period of 81 days. Special efforts were made to provide good motivation.

At the end of this experiment four of the seven children had become perfect in distinguishing pitches on the tuning forks down to one-half a vibration, the others distinguishing perfectly from two to five vibrations. This they did ten times in ten trials. When the usual criterion of discrimination of eight out of 10 trials was employed, all distinguished down to one-half a vibration. The authors say in summary: "Each pupil improved noticeably in ability to sing. At the conclusion of the experiment, one pupil sang the words and music of several songs with no trace of pitch deficiency; and also sang major and minor scales, chromatics, intervals, and tones picked at random. Another sang scales and intervals and the music of a song without words. Two pupils sang scales and intervals. The other three pupils sang, not perfectly, but with tremendous improvement over their initial efforts. Where formerly these pupils had no conception of pitch or range, they now have open to themselves the possibilities of music."

How can we reconcile these findings with those of Buffum reported by Seashore? Probably an important reason for the failure of Buffum's subjects to improve lay in the fact that they were evidently put through a process of mechanical repetition or drill, with no provision for maintaining motivation through interest, knowledge of results, or joy in the task. In the author's nursery school and in Dr. McGinnis' study special personal attention was given to motivation, and in the Jersild-Bienstock study there was at least interest, since singing is of more interest to a child than merely making a series of judgments. Comment on Seashore's early evalua-

²⁴ M. Wolner and W. H. Pyle, "An Experiment in Individual Training of Pitch-Deficient Children," *Four Educ Psychol*, 1933, 24 602-608

tion of the pitch-discrimination test and its diagnostic significance for children is superfluous.

The Development of Other Abilities.—Are other mental abilities equally susceptible to improvement? No general answer can be given. The amount and character of the improvement, and the degree to which the increased ability is retained, are dependent on the character of the ability and also, in some cases, on the conditions of its development in the individual child.

In a related study by Jersild and Bienstock on "Training and Growth in the Development of Children,"²⁵ six other simple abilities were studied under the same conditions as ability to reproduce notes of a given pitch. The abilities studied were speed of color naming, strength of grip, lung capacity, speed of free association (the median time taken to give the first word that comes to mind in response to each of a list of stimulus words), strength of back, and speed of tapping with a stylus on a metal plate. In the case of tapping, lung capacity, strength of back, and free association, the practice group gained only a small amount over the controls during the training period of three-and-a-half to six months. In color naming the gain was substantial. But in all these abilities when retests were given several months later the practiced children had lost their temporary advantage. It is a question whether this loss would have occurred had the practice been more highly motivated.

Josephine Hilgard carried out an interesting experiment using the method of co-twin control.²⁶ Both of a pair of identical twins, after initial tests at the age of 54 months, were given an equal amount of practice, over a period of a number of months, in memory for digits and objects, throwing rings over a post, cutting paper along lines, and walking along boards. But in a particular ability one twin was given practice at the beginning of the period while the other served as control, and later the first twin rested in that function while the other was given practice. Each practice period was

²⁵ A. T. Jersild and associates, *Training and Growth in the Development of Children*, Teachers College, Columbia Univ., Child Develop. Monogr., No. 10.

²⁶ J. R. Hilgard, "The Effect of Early and Delayed Practice on Memory and Motor Performances Studied by the Method of Co-Twin Control," *Genet. Psychol. Monogr.*, 1933, 14: 493-567.

eight weeks in length, with three practice periods per week, and in case of each test delayed practice began three months after the early practice. Interesting differences in amount of gain and amount of retention in the different abilities were apparent under conditions of initial and delayed practice, but three and six months after practice "the performance of the twins on all tests were as similar to each other as at the beginning of the experiment."

This study suggests the importance of maturational factors at this early age—mere growth of nerve and muscle seems to be one factor in the development of the abilities in question. On first thought the gain of the control twin might be thought to rest entirely on mere growth of nerve and muscle. But we must remember also that although the control twin was not getting practice in the specific abilities measured, he was, as a normal active child, getting a good deal of practice in related abilities which may well have been an important factor in his gain. Also, he actually got, later on, the specialized training. In this particular situation, with these two subjects, special early practice of one resulted in no permanent advantage in the abilities tested.

But we should not generalize too broadly from this one comparison. Evidently the practice was more or less routine, not highly motivated, and this may be a reason for its having been no more effective than it was. We shall come back to this problem again in connection with the topic of motor learning. Meanwhile Hilgard's study is of interest, along with that of Jersild and Bienstock, and McGraw's work mentioned in chapter four, because of its recognition of the complexity of the problems involved in the study of "native abilities" in relation to maturation and learning. When should training be introduced, to be most effective, how long should it continue, and what functions are particularly affected by training? These and other related problems all call for experimental analysis. Such workers with children as Jersild, Hilgard, and McGraw²⁷ have barely made a start, and only a few general psychologists, notably Carr,²⁸ have

²⁷ See "Phylogenetic Activities and the Effect of Exercise upon Them," chap. 3 in Dr. McGraw's *Growth, A Study of Johnny and Jimmy*, Appleton-Century, 1935.

²⁸ H. Carr, "Teaching and Learning," *Ped Sem & J. Genet Psychol*, 1930, 37. 189-219.

recognized the importance of detailed analysis and study of all these factors.

No one can read for long in the experimental literature on individual differences; no one can teach for many weeks a group of normal children of any age, no one can work for long in any office, shop, or factory, without being impressed with the tremendous range of individual differences in all sorts of abilities. It should be clear from the discussions of this chapter that these genuine and important differences cannot be explained on any simple basis — and that no general statement as to the relative importance of heredity or environment in causing them can be made.

Nor can we ever be sure that a given degree of a particular trait or ability in a particular child is due to heredity. It is necessary to inquire how this difference originated and how persistent or variable it is — in other words, what were the conditions of its development. In some individuals, inferiority might be the result of environmental factors, as in the case of a child who fails to learn new tunes because of emotional inhibitions. Another child of the same age might fail to exactly the same extent, owing to inherited deficient structure of the organ of Corti in the ear — he may be a “physiological monotone.” And of course the deficiency in the organ of Corti might be an acquired organic deficiency — one result, let us say, of whooping cough. Our individual difference in this case would be organic and permanent — and incurable — but not hereditary.

It is clear that although heredity is more important in the development of some mental traits than others, both heredity and environment are always involved in the development of every trait. And the facts do not justify us in making the statement that any trait is either hereditary or environmental. There are too many individual exceptions, there is too much variability in the rôle of the two factors according to circumstances.

We must conclude then, that the question whether a given condition or trait is susceptible to control depends, not on the extent to which hereditary or environmental factors were involved in its development, but *on the nature of the condition or trait* as it exists in a particular child. Mistaken theories of heredity and of the impossibility of changing “nature” have

undoubtedly led in the past to the discouragement of individual initiative and often, unfortunately, to the withholding of opportunity from children who could profit by it. Remembering the "pitch-deficient children" to whom were opened the rich possibilities of music, we may entertain the reasonable hypothesis that many abilities among ordinary children are undeveloped, many capacities for work and for enjoyment not utilized.

SUGGESTIONS FOR READING

An excellent treatment of individual differences is Anne Anastasi, *Differential Psychology* (1937), which presents a wealth of concrete information. . . C Spearman's *The Abilities of Man* is a theoretical and highly original treatment in which there is a good deal of reference to intelligence as well as special abilities. It is not for the beginner. . . Leta S. Hollingworth has a good chapter on "The Child of Special Gifts or Special Deficiencies," in the 1933 edition of the *Handbook of Child Psychology*. . . Norma Scheidemann's *The Psychology of Exceptional Children* (new edition, 1937) presents a great deal of information and good bibliographies. The author, however, does not accept some of her generalizations and interpretations. . . Anderson and Foster, *The Young Child and His Parents*, is recommended as furnishing concrete illustration of the complexity in the causation of individual differences.

CHAPTER VII

THE DISTRIBUTION AND DEVELOPMENT OF MENTAL CAPACITIES: GENERAL INTELLIGENCE

MUCH of what we have said about the measurement of particular mental traits and abilities, and the generalizations about the distribution and development of these, applies equally well to general intelligence. For we have no way of measuring general intelligence, which we have referred to as the ability to make effective adjustments to new situations, except by measuring particular abilities which are involved in this general ability.

Back in the nineties, and later for that matter, it was thought that such simple tests as those of reaction time, sensory discrimination, and rote memory, which did reveal constant individual differences, might be valid measures of general intelligence. But their wide use soon showed, even before statistical methods came to be applied commonly, that such measures did not correspond in any useful way with other criteria of intelligence, particularly teachers' marks and careful estimates of intelligence.

Everyone who has studied elementary psychology should know how, out of the early interest in the testing of individual differences, there developed, under the leadership of the French psychologist Alfred Binet, the method of using as a measure of general adaptability a composite score on a large number of tests of many different mental functions. Such composite scores did prove to have a rough but useful correspondence with grades and estimates of intelligence. With repeated revisions and careful statistical treatment, the descendants of the original Binet-Simon tests (for Dr. Simon, a colleague of Binet, helped to prepare them) have proved to be of great value in diagnosing individual children and in clarifying theoretical problems. They are on the whole *reliable*, because there is a relatively high correlation between the scores of children on one test and on a second or third test

taken in later years. They are on the whole *valid*, because there is a similar degree of correlation between these scores and other criteria of intelligence with which we compare them, particularly teachers' grades and estimates. But in both cases the correlations are far from perfect. Why?

The aim in all this work has been to get at stable underlying differences among children; in other words to measure, indirectly to be sure, native or hereditary intelligence. But is this possible? And is it even true that general intelligence, whether we can measure it accurately or not, can be said to be hereditary or not hereditary?

Since the sort of individual tests used in scales for measuring intelligence were shown in the last chapter to be very imperfect measures of native ability, and the scores often capable of marked improvement through training, we might assume at the outset that the composite tests can not measure native intelligence. But it is possible that the greater scope and complexity of the intelligence tests makes them far more valid instruments than tests of particular abilities. Besides there would still remain the general question as to whether the intelligence underlying the test performance can be said to be hereditary. In any case, considering the great practical importance of the subject both from the point of view of individual guidance and of social control, a somewhat detailed consideration of the part played by heredity in the growth of intelligence is desirable.

Is General Intelligence Hereditary?—Considering general intelligence as the ability to react adaptively to new situations, we may consider that it is shown in the degree of eminence attained by an individual. Thus the incidence of superior intelligence among the relatives of a given person known to be superior, may be roughly estimated by finding out how many are listed in *Who's Who?*, how many are rated as superior by independent judges, and in other ways. Now, a good many studies have been made which show a high proportion of eminent men among the relatives of such geniuses as Macaulay and Darwin, as compared with the proportion in an unselected group. But of course it may be argued that social environment and education account for the superiority, rather than heredity. The same thing may be said of the biographical studies made by various investigators

of the relatives of children who make high scores in intelligence tests.

Investigations of the families of gifted children when made objectively by means of mental tests are more significant than those utilizing the methods just discussed. Such investigations, made by Terman and others, show that among siblings (brothers and sisters) of very superior children there is a much greater percentage of "genius" as indicated by tests than among the population at large.

Before we consider to what extent high intelligence is due to heredity, it may be well to review the nature of the tests and the method of scoring. The Terman (Stanford) tests,¹ revised from the original Binet series, consist of a large number of simple problems — words to define, numbers to repeat, stories to interpret, puzzles to solve, and the like. The method of fixing the age standards was as follows. Quite a number of children of a particular age, say eight years, were given the tests, beginning with the easier ones. It was then determined what was the average number of tests these children passed successfully. Assuming this particular group to be typical of eight-year-old children in general, a certain range of achievement on either side of this average was set as being the normal range for eight-year-olds. Hereafter any eight-year-old child whose test record fell within this range was said to be normal.

If a child's score in the tests was the same as the average score for the standard group, he was said to have a mental age of just eight. For every test he passed, a certain fraction of a year's credit was added to the mental age already earned. If a child failed to pass enough tests to reach the previously determined standard range, he was said to be under age, or mentally below normal. Thus a given eight-year-old might be able to reach only the six-year average, and no higher. He would then be said to have a mental age of six, or to be two years retarded mentally. If a child succeeded in passing tests above the standard set for his age, he was said to be over age, or mentally above normal. A mathematical expression of any child's performance as compared with others of his age is obtained by finding the ratio of his mental age to his

¹ The last revision appeared in 1937. See L. M. Terman and M. A. Merrill, *Measuring Intelligence*, Houghton Mifflin, 1937.

chronological age. This is the intelligence quotient or I.Q., a concept first used by William Stern. The child of eight who passes enough tests to earn a mental age rating of ten, thus has an I.Q. of $10/8$ or 125, the decimal being usually omitted.

This description of the intelligence tests most commonly used makes it clear at once that the I.Q. is not a direct measure of inherited intelligence, but that it depends in part upon acquired knowledge, and particularly upon ability to handle language. The same thing is true of other scales modeled on the Binet tests, such as the Kuhlmann-Binet tests for young children, and the excellently standardized contemporary revision and adaptation of these preschool tests, the Minnesota Preschool Scale. It is also true of the many scales, omnibus tests (using many miscellaneous items), and groups or batteries of tests (comprising most of the tests in use), in the performance of which language plays a large part.²

In many of these composite tests the I.Q. is not employed, but merely some statement of the child's relative rank in a group of children of his own age. For example he may rank in the top hundredth (called the first *percentile*), or the top fourth, when compared with the group of children on whom the test was standardized, or he may rank very low, having a *percentile rank* of 80, let us say, or ninety-two. Many of these composite tests are group tests, with blanks for replies to be filled in by students. But those which are designed for careful administration to individual children are likely to be more valid and more reliable.

The dependence of test performance on experience will be apparent to the student if he takes a standard mental test himself, and every student who has not had one should get that experience. It will also be clear after a critical examination of lists of test items from the two best individual scales now in use.

Following is a description of some of the test-items and of the method of administration for year eleven of the new (1937) Stanford-Binet scale. Two months credit is allowed for each test item handled adequately.

² For a description of tests of this type see any standard book on mental testing, such as that of F. N. Freeman, *Mental Tests*, Houghton Mifflin, 1926.

YEAR XI

1. Memory for Designs

Material Card with two designs.

Procedure Before showing the card say, "*This card has two drawings on it. I am going to show them to you for ten seconds, then I will take the card away and let you draw from memory what you have seen. Be sure to look at both drawings carefully.*" Then show the card for 10 seconds, holding it at right angles to the child's line of vision and with the designs in the position given in the plate. At the end of approximately 4 seconds say, quietly, "*Look at both.*" Have S. reproduce the designs immediately, and note which is the top of his drawing.

2. Verbal Absurdities III

Procedure: Read each statement and, after each one, ask, "*What is foolish about that?*" If the response is ambiguous, say, "*Why is it (that) foolish?*"

(a) "The judge said to the prisoner, 'You are to be hanged, and I hope it will be a warning to you'."

(b) "A well-known railroad had its last accident five years ago and since that time it has killed only one person in a collision."

(c) "When there is a collision the last car of the train is usually damaged most. So they have decided that it will be best if the last car is always taken off before the train starts."

3. Abstract Words I

Procedure Say, "*What is . . . ?*" or "*What do we mean by . . . ?*"

(a) Connection, (b) compare, (c) conquer, (d) obedience, (e) revenge.

The Minnesota Preschool Scale does not make use of the concept of mental age but simply gives for each test passed credit toward a total score. Following are a number of the tests, which are designed for children from 18 months to five years.

II. POINTING OUT OBJECTS IN PICTURES. Say "Now I have some pictures to show you." Show card A-2 Ask "Where is the man? Put your finger on the man" (The word "daddy" may be substituted if the child recognizes the term more readily) Repeat and urge if necessary. If the child does not respond, take his hand and put it on the man, saying "See, there is the man. Now show me the chair." Continue in the same manner with *apple, house, flower*. If the examiner is uncertain which picture the child is pointing at, say "Which do you mean? Put your finger right on the . . ."

Children who talk well often go on after the first picture and name the others spontaneously without waiting to be asked. If the child prefers this method, let him use it, it is a higher type of performance than that standardized. Always permit the child to follow his own way whenever possible, since better cooperation is gained if over-direction is avoided.

Be sure, however, that the method used by the child is at least equal in level to that called for in the instructions

III. NAMING FAMILIAR OBJECTS. As a fore-exercise show the child the cup and say "What is this?" Repeat and urge if necessary. Then continue with the *ball, watch, pencil, scissors*. If the child's articulation is very hard to follow or if he has been taught some outlandish expression at home, do not penalize him. Call upon the mother or nurse for interpretation if necessary, but if there is any question of bias on the adult's part, make occasion to re-test the child a little later and see if he uses the same term again. Any name *consistently* applied to the object by the child is accepted as correct.

V. IMITATIVE DRAWING. Place pencil and paper before the child and say "*Now watch and see what I am going to make.*" Take the pencil and make a single vertical stroke about two inches long. Then hand the pencil to the child and say "*You make one like that.*" Urge if necessary. If no satisfactory response can be elicited, repeat the demonstration until the child makes an attempt to imitate it, or until it is obvious that he cannot perform the task.

The last test in the Minnesota list is one which does not require the use of language by the child. This represents a type of test which has been found increasingly useful in an effort to avoid items greatly influenced by cultural environment or special language facility or handicap. In the Minnesota scale a separate I.Q. can be calculated on the basis of the performance items alone. Some performance tests do not have verbal instructions — directions are given in pantomime.

Performance tests often elicit better performance from underprivileged or foreign groups or children with special handicaps, yet they show as wide individual differences as the conventional type of test. It cannot be argued, however, that performance tests are independent of special experience, even if the materials used are geometrical forms or specially constructed objects or puzzles which are not used as materials for instruction or for play in any cultural group. For even if the use of a pencil or other means of indicating answers is known to the person being tested (and this is not always the case), the very *experience of being tested* is one which is much more natural in some cultures than others.

The argument is advanced that the tests nevertheless do give a measure of inherited intelligence, because they are of such a nature that it can be assumed that all children brought up in a given country under normal conditions will have had

an optimum opportunity to acquire the abilities in question. If they have not done so for a significant number of the tests, this indicates to that extent inferior native ability.

This argument is logical and has some validity, but it fails to take account of certain important differences in opportunity. We may indeed expect that most children will be exposed to the same general type of home and school training. But there must be many exceptions. Social and racial status, as well as lack of encouragement at home, poor health, lack of incentive, or other personality handicaps, have all been shown to be, in individual cases, factors in inferior performance on the tests. We are beginning to realize the importance of the fact that even children brought up in the same family are subject to differing social environments. We have seen that many subtle influences, acting prenatally or postnatally, may affect intelligence. Certain types of evidence that differing environments measurably affect the I.Q. and its development will be discussed while dealing with related "hereditarian" arguments.

In any case, runs a common argument, we know that idiocy and other extreme forms of mental defectiveness are associated with an inherited cortical deficiency,³ hence intermediate degrees of intelligence must be related to hereditary cortical differences. If these inherited differences exist, the most reasonable assumption is that they are expressed in the I.Q. or score on tests. But we have no right to assume that all or even nearly all the intermediate differences revealed by intelligence tests are based on differences in cortical endowment, unless all other hypotheses are tested and found wanting. The hypothesis is not *proved* by the existent data on the scanty cortical equipment of idiots.

Statistical studies of family groups are often cited as evidence for the potency of heredity in determining the I.Q. The I.Q.'s of siblings are found to resemble each other much more closely than those of unrelated children. It is true that numerous investigators have found significant positive correlations between the intelligence quotients of siblings, and still higher correlations between twins. With various types of mental tests, correlations have been found varying from

³ Actually, this statement runs counter to our knowledge of many of these extreme cases

about $+ .25$ in the case of cousins (Dexter) to $+ .80$ for twins (Thorndike). Willoughby found that family similarities in mental-test abilities resulted in an average positive correlation of $+ .40$.⁴ Gertrude Hildreth found correlations between intelligence test scores of siblings of $+ .63$ in the case of 671 public school children of Oklahoma; $+ .27$ for 523 children in a superior New York private school; and $+ .32$ for 346 New York children of inferior social status. The last two correlations illustrate the fact that the less the range or "scatter" of abilities, the smaller the correlation is likely to be.⁵

Since for unrelated children taken at random, correlations on such tests are zero, these figures are often interpreted to mean that the test achievements are due to inheritance — and certainly heredity must play a part in them. It is evident, however, that these investigations have not excluded the influence of social and other environmental factors. Brothers and sisters have a more similar environment than cousins, and twins a more similar environment than ordinary siblings.

Probably the most valuable way of trying to measure the effect of environment is to compare the degree of similarity of identical twins, produced from the same egg and sperm, and hence with the same equipment of genes, with that of fraternal twins coming from different egg cells fertilized by different sperms. It may be assumed that any differences found between identical twins will be due to environment, while differences between fraternal twins will be due to both hereditary and environmental factors.

The reader will keep it in mind that we classify as environmental various prenatal influences including intercellular factors causing such differences as reversals in symmetry. This usage differs from that of F. N. Freeman and his associates at Chicago.

Chicago investigators have been carrying on for more than ten years a careful comparative study of fraternal twins, and of identical twins reared together and identical twins reared

⁴ See the studies in the section on "Family Resemblance," in the 27th Yrbk Natl. Soc. Stud. Educ., Public School Publ. Co., 1928, Pt. I, 41-99.

⁵ G. W. Hildreth, *The Resemblance of Siblings in Intelligence and Achievement*, Teachers College, Columbia Univ., Contrib. to Educ., 1925, No. 186.

apart. This study, the most comprehensive study of twins so far carried out, is now complete. It has been reported in the book *Twins: a Study of Heredity and Environment*, by the zoölogist Newman, the psychologist Freeman, and the statistician Holzinger (1937).

The first part of the report presents the results on two groups of twins, 50 fraternal like-sex twins and 50 identical twins, reared together. The results agree with those of other investigations in showing a much closer agreement on tests between identical than between fraternal twins. Table 4 gives some of the correlations found.

TABLE 4. CORRELATIONS BETWEEN TWINS IN SEVERAL MEASURES, CHRONOLOGICAL AGE CONSTANT *

| <i>Measure</i> | <i>Identical (50 pairs)</i> | <i>Fraternal (50 pairs)</i> |
|--|---------------------------------|---------------------------------|
| Standing height | .93 | .64 |
| Finger ridges, left hand | .92 | .50 |
| Arithmetic | .72 | .68 |
| History & Literature | .82 | .67 |
| Educational age | .89 | .69 |
| Binet I Q | .88 | .63 |
| Otis I.Q. | .92 | .61 |
| Woodworth-Mathews personality test score | .55 | .36 |

* Condensed from Newman, Freeman & Holzinger, p 97. The third decimal points are omitted.

In the table, finger ridges means counted number of finger ridges. The educational items are based on standardized tests of school achievements (the Stanford tests), "educational age" being a composite measure of achievement on these tests. The Otis I.Q. is based on a test similar to the Binet tests we have described. "Woodworth-Mathews" refers to a questionnaire about nervous habits.

The correlations indicate less similarity between fraternal twins in every case. In fact they are little higher than the correlations found when siblings (brothers and sisters) are compared in similar abilities, as we should expect considering

that fraternal twins develop from different eggs, and are no more similar genetically than siblings.

To the extent that the correlations for identical twins are less than 1.00, environmental differences are effective, according to the argument advanced above. The very high degree of relationship in scores is evidence of the weight of heredity. But since the twins have been reared together, the environment has also been very similar — and such figures give no indication of the extent to which marked differences of environment could cause differences in the various measures. We do notice that in the case of some measures the identical twins are less similar than for others. Evidently rather small differences in environment are likely to affect some traits more than others. Figure 15 shows in graphic form the relative amount of the average differences between fraternal and identicals, in three of the traits measured.

A consideration of the differences between the 19 pairs of identical twins reared apart since infancy will furnish the crucial evidence as to the possibility of marked environmental influence on such a stable measure as the I.Q. (as it will upon other traits). Most of these twins were first examined when adults, but a few were in their teens; most of them had been separated for a long period of years, the intervals varying from 11 to 53 years. Twelve out of 20 cases (including one pair studied by Miller and included in some of the comparisons) had been separated in the first year of life, five during the second, and one each during the third and fourth, and one during the seventh year. In most of the cases the twins had been known to each other but there was visiting only at long intervals. In six cases there was complete separation, with no communication, for a long period of years. In two cases the twins lived close together and saw each other frequently. The range of home environments was not uncommonly wide, and no radical differences in race or religion were present.

Before considering the statistical evidence, the student really should read as many of the case studies as he can, because in no other way can he appreciate the kind of environmental differences that existed, and the way in which they affected the lives of the people concerned. The authors have wisely included some short human-interest stories about the

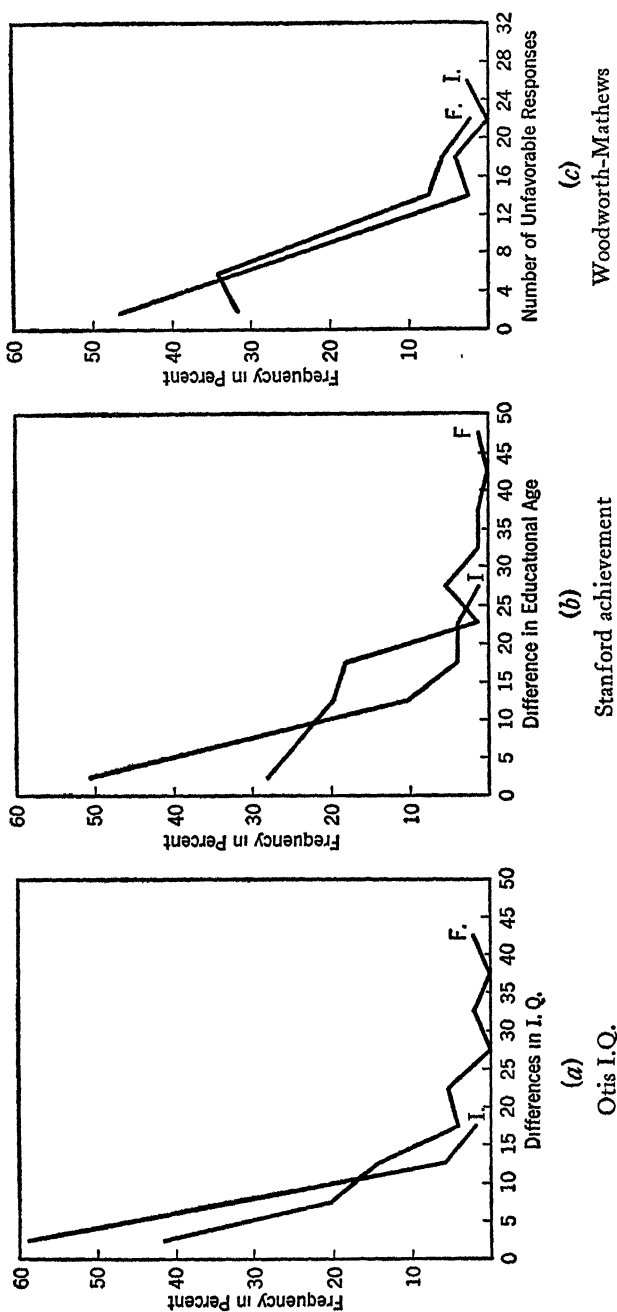


FIG. 15. CURVES OF DISTRIBUTION OF DIFFERENCES IN THREE OF THE TRAITS
MEASURED IN IDENTICAL AND FRATERNAL TWINS

From Newman, Freeman, and Holzinger, *Twins*. By permission.

twins, as well as longer case studies. Although the authors say they have told bare facts with no attempt at literary skill the accounts are extremely interesting.

In certain few cases the twins turned out as like as two peas, with as much difference also as two peas commonly show. In some cases there were striking differences in intelligence test scores. In a number of cases large differences in social environment were reflected not only in differences in intelligence test scores but in much more pervasive and striking differences in social ease and adaptability.

On the extent and personal significance for the individuals concerned of the unfavorable effect of poor social status or poor family background the authors do not dwell, but the facts speak eloquently of the important influence for general development of a good and happy social environment. When we see two people whom we know to be equally gifted by nature, so different in their response to the world and in their ability to enjoy life, we need no statistics to prove to us the importance of environment. Had some of these separated twins been brought up in a remote hamlet of East Tennessee, or in certain orphanages,⁶ the differences both in intelligence and social adaptability would almost certainly have been more striking.

We may consider the case of the twin sisters, Helen and Gladys, obviously the same in physical endowment, both healthy, normal, attractive women of thirty-five. Both have successfully earned their own living, both are married and have children. Gladys, spending her early years in a poor foster home and moving from place to place, never got beyond the third grade in school. But she must have continued to read and learn informally because, after two years' work in a knitting mill, she became a saleswoman in a store and finally a clerical worker. She has lived in a large city for a number of years. She has never been well-off, has not had rich cultural advantages. She is now ill-at-ease socially and does not know how to dress well or create a favorable impression.

Helen did not live in a home much different from this one, but had every educational opportunity and was graduated

⁶ See page 181.

from a good college and became a school teacher, teaching English, history, and dancing. She has had extensive social opportunities and is now, with her husband, rather well-off financially. She is "a confident and suave person with rather marked charm of manner. She makes the most of her personal appearance, moves about gracefully. . . . She conversed smoothly without a trace of diffidence and always took the lead in all matters pertaining to arrangements for the trip and stay in Chicago."

In every test of mental ability Helen is much above Gladys. In the Stanford-Binet the difference is three years ten months, or 24 points in I.Q. Helen's score is at the 20th percentile and Gladys's at the 89th, hence 69 per cent of the scores of the general population would lie between these scores.

This difference is the largest difference in I.Q. of the separated identicals, and corresponds to the greatest difference in educational opportunity. A survey of all the 19 cases shows that "in no case is there a significant difference in ability in the opposite direction to a significant difference in education. In the only case in which a large difference in education is not accompanied by a large difference in ability, a large difference in physical condition may have neutralized the educational superiority. In no case is there a large and consistent difference in ability without a marked difference in the environment."

For the 20 pairs, ratings of educational, social and physical environmental differences were made on a scale of ten on the basis of the case histories by five independent judges. The ratings were found to agree closely. Correlations were then calculated between these ratings and the differences in certain traits. The correlations indicate a close relationship between differences in educational opportunity and differences in intelligence tests, the correlation between Binet I.Q. differences and educational differences being $+ .79$. A still higher correlation ($+ .90$) was found between differences in educational ratings and in Stanford educational age. Correlations between the various physical ratings and the traits considered were nearly all non-significant. On the whole the statistical treatment of the environmental differences between the pairs supports the conclusions made on the basis

of a general analysis of the relation of twin-differences to case histories.

The following table shows correlations for the unseparated and separated identical twins in leading traits.

TABLE 5. CORRELATIONS FOR UNSEPARATED AND SEPARATED IDENTICAL TWINS *

| <i>Trait</i> | <i>Unseparated Identicals</i> | <i>Separated Identicals</i> |
|----------------------|-----------------------------------|---------------------------------|
| Standing height | .98 | .96 |
| Sitting height | .96 | .96 |
| Weight | .97 | .88 |
| Head length | .91 | .91 |
| Head width | .90 | .88 |
| Binet mental age | .92 | .63 |
| Binet I Q. | .91 | .67 |
| Otis I Q. | .92 | .72 |
| Stanford Achievement | .95 | .50 |
| Woodworth-Mathews | .56 | .58 |

* Condensed from Newman, Freeman & Holzinger, p 347. The third decimal points are omitted.

Notice that there is very little difference between the two in the physical traits. But in the case of all the mental traits the separated identical twins differ very much more than those who grew up together, except in the one case of scores on the Woodworth-Mathews questionnaire about nervous habits. There is a striking difference in the correlations on all the intelligence tests and on the school achievement test. This is indeed a crucial comparison. The fact that as large differences in intelligence as this exist, when the environments of the separated twins were really not greatly different, affords unquestionable evidence that environmental conditions operating over a period of years may definitely affect the I.Q. Even one case of a marked difference in I.Q. between identical twins would show the possibility of such an influence. Newman, Freeman and Holzinger have described several such cases.

This study of twins has been a study of people of the same heredity, brought up under different environments. Another mode of attack on our problem is to study the effects of a changed environment having certain common features (i.e., more cultural and stimulating, or depressing, as in a home for the feeble-minded) upon the intelligence test scores of a group of children of different heredity. There have by this time been a number of good studies utilizing this approach. Certain studies of foster children will be discussed to illustrate the approach and to indicate the character of the results.

In this type of study we again find the Chicago group responsible for one of the outstanding studies. In 1928, Freeman, Holzinger and Mitchell published their report of a study of 671 foster children.⁷ These children were tested before placement, and again after several years in a good foster home. The children's scores are grouped for analysis according to special conditions, i.e., siblings reared in the same home, children adopted at an early age, etc. One group of 74 children, after an average residence of four years in the foster home, made a significant gain in intelligence test score. The authors present data to show that this gain represents about seven I.Q. points and believe it is good evidence for a rather striking influence of environment on intelligence. (Hereafter when we say intelligence we shall always mean intelligence test score.)

Another test involved a comparison between siblings who had been brought up in different foster homes. The correlation in intelligence between 125 sibling pairs who had been separated in different foster homes from four to thirteen years was $+ .25$, much less than for siblings reared in the same home. This indicates clearly that home environment, as well as hereditary factors, is important in determining the test score.

When the sibling pairs were divided into two groups by putting into one group the number of the pair who was in the better foster home, and into the other the one in the poorer home, the average I.Q. of those in the better homes was 95, that of those in the poorer homes 86, and the difference was

⁷ F. N. Freeman, K. J. Holzinger and B. C. Mitchell, "The Influence of Environment on the Intelligence, School Achievement, and Conduct of Foster Children," *27th Yearbk. Natl. Soc. Stud. Educ.*, *op. cit.*, Part I, 103-217

statistically reliable. The foster homes were rated on material environment, evidences of culture, and education. The correlation between the intelligence of this sibling group and the home rating was $+ .40$. It might be argued that this was due to "selective placement," to a tendency for intelligent parents to choose a more intelligent child for adoption, and the authors grant that this is a factor for some groups. But it could hardly be so important in the case of separated siblings. The family records for prospective foster children at the time of adoption were meagre, and for siblings the family history would be the same. The authors present a number of comparisons bearing out their contention that selective placement could not have been the determining factor. The conclusion as to the influence of environment on test scores is supported by the fact that correlations between I.Q.'s of unrelated children brought up in the same home ranged from $+ .25$ to $+ .37$; and that a correlation of $+ .37$ was found between intelligence of the "home group" of 401 children and the intelligence of their foster parents as measured by the Otis test for adults. In this group, a correlation of $+ .48$ was found between home rating and intelligence of foster children. In this case selective placement must have been one factor, but the authors argue that the evidence from the sibling group showing that selection was not important would indicate that it is at least not the main factor in this correlation.

The study is too extensive and too complex to do justice to in this brief notice. The student should consult the original text. The present author believes that in view of the carefulness of the study, with the many control comparisons made and in view of the fact that many minor results of the study, as well as major findings, all point in the same direction — that of a significant environmental influence on I.Q. — we must accept it as a demonstration of the potency of environment in addition to heredity in determining "intelligence."

Another carefully controlled study of foster children made by Barbara S. Burks employs the same type of analysis as the Chicago study. In this investigation there was probably less selective placement since the children were placed in the foster homes before 12 months, while in the Chicago study many

were placed when several years old. On the whole this study supports that of Freeman and his associates in indicating that residence in a superior foster home increases the intelligence of children, although Burks did not find quite so marked an effect. She believes that her data indicate that the extreme degree to which the most favorable home environment may enhance the I.Q., or the least favorable environment depress it, is about 20 I.Q. points.⁸

A more recent study of foster children by Leahy⁹ was undertaken to find reasons for the discrepancy between the Chicago study and that of Burks. Leahy used rigid criteria for excluding selective placement as a factor in the correlations. Comparing a group of 194 children adopted before six months with a group of "own" children carefully matched for age, occupational status, etc., she found low but significant correlation between intelligence scores of adopted children and of foster parents. The correlation between adopted children's I.Q. and cultural status of the foster home was $+0.21$. For the control "own" children, however, the corresponding correlation was $+0.51$. With the adopted and control children equated (statistically) as to the true father's occupation (for 89 cases), the correlation of the adopted children's I.Q. with that of their foster parents ("mid-parent") was $+0.26$.

These correlations are significantly lower than those in the Chicago study, lower even than in that of Burks, which would suggest that in the former studies selection played more of a rôle than was thought. Nevertheless they do indicate an effect of environment on the I.Q., which, according to Leahy, cannot be effective to the extent of more than four per cent. Some of Leahy's assumptions, such as that there could have been no difference between own and adopted children in such attributes as self-confidence and "drive"; and that the inclusion of illegitimate children only, would result in a more variable family background, are, in the present author's opinion, open to question. The group is an unusually homoge-

⁸ B. S. Burks, "The Relative Influence of Nature and Nurture upon Mental Development. A Comparative Study of Foster Parent-Foster Child Resemblance and True Parent-True Child Resemblance," *27th Yrbk Natl Soc. Stud Educ*, *op cit*, Part I, 219-316

⁹ A. M. Leahy, "Nature-Nurture and Intelligence," *Genet. Psychol Monogr*, 1935, 17 236-308

neous one, a factor always tending to lower correlations, as we have pointed out. The study has been criticized on statistical grounds¹⁰ but we cannot enter into the details of the statistical arguments.

An extensive long-time study of foster children now in progress in Iowa already provides valuable additional evidence. The first reports on this work, by H. M. Skeels, do not support Leahy's conclusions. Skeels showed that for 73 children placed under six months of age, selective factors were not operative in the placement. He found no correlation between the true mother's I.Q. and the child's I.Q. This finding, he says, is consistent with Snygg's report of the non-significant correlation of $+ .13$ between the I.Q.'s of 312 children adopted at an early age, and their mother's I.Q. The average I.Q. of Skeels' 73 children, who were tested from 12 to 60 months after placement, was 115, which is about the I.Q. that is usually found in children from the two highest occupational groups. Yet only 10 per cent of these children's true fathers came from those groups.

When 74 more cases were later tested in the same study, the same type of results was obtained. One striking finding was that an average I.Q. of 116 was obtained for all children whose true mother's I.Q. fell at the border line or feeble-minded level (below 80).¹¹

One reason for asking critical questions about even such excellent work as that of Leahy is thus that her results are not in accord with the trend of other careful investigations of recent years. We cannot take any more time for even brief discussions of particular pieces of work. But careful studies utilizing various controls have yielded convincing evidence that unfavorable environments (homes for the feeble-minded,¹² isolated mountain communities¹³ and underprivi-

¹⁰ W. D. Wallis, "Observations on Dr. Alice M. Leahy's 'Nature-Nurture and Intelligence,'" *Ped Sem. & J. Genet Psychol*, 1936, 49 315-324.

¹¹ H. M. Skeels, "Mental Development of Children in Foster Homes," *Ped Sem & J. Genet Psychol*, 1936, 49 91-106. See also by the same author, "Mental Development of Children in Foster Homes," *Jour Consult Psychol*, 1938, 2 33-43.

¹² O. L. Crissey, "The Mental Development of Children of the Same I.Q. in Differing Institutional Environments," *Child Develop*, 1937, 8 217-220.

¹³ M. Sherman and C. B. Key, "The Intelligence of Isolated Mountain Children," *Child Develop*, 1932, 4 279-290. L. R. Wheeler, "The Intelligence of East Tennessee Mountain Children," *Jour Educ Psychol*, 1932, 23 351-370.

leged homes¹⁴) result in marked and sometimes progressive deterioration of intelligence as expressed in I.Q.'s. Conversely other studies indicate that stimulating environments such as those provided by nursery schools¹⁵ and, particularly, good grade schools¹⁶ have a measurably favorable effect upon the growth of intelligence in children.

It is not always true that well-known facts can be supported by statistics. Conditions may be too complex or material may be too difficult to gather. Hence these studies of the effects of differing environments on I.Q.'s are particularly significant. If it be argued that after all intelligence — actual innate capacity as determined by the genes — is not changed at all, we will agree, granting that definition of intelligence. But what society is interested in after all, and what parents and children are interested in, is not a hypothetical capacity that once may have existed, but the actual degree to which the individual concerned can adapt himself successfully to the complex conditions of living in this world.

One additional comment on all of these studies the author would like to make. The conclusions so often drawn, that the greatest extent to which an unfavorable environment can depress the I.Q., or a favorable one raise it, is so many I.Q. points (20 according to Burks, four according to Leahy), *hold only for the groups dealt with in the study in question*, and should not be given general application. In the case of Gladys and Helen we saw that for two children with as nearly the same heredity as it is possible to have, the effects of environment were operative in causing a difference of just 24 I.Q. points. Yet the general environmental difference was not extreme.

The author would like to submit a case in which a very minor aspect of an unusually favorable environment un-

¹⁴ H. M. Skeels and E. A. Fillmore, "The Mental Development of Children from Underprivileged Homes," *Ped Sem. & J. Genet. Psychol.*, 1937, 50 427-439.

¹⁵ H. E. Barrett and H. L. Koch, "The Effect of Nursery-School Training upon the Mental-test Performance of a Group of Orphanage Children," *Ped Sem & J. Genet Psychol.*, 1930, 37 102-122. F. L. Goodenough, "A Preliminary Report on the Effect of Nursery-School Training upon the Intelligence Test Scores of Young Children," *27th Yrbk Natl Soc. Stud. Educ.*, Part I, 361-369. B. L. Wellman, "The Effect of Preschool Attendance upon the I.Q.," *Jour. Exper. Educ.*, 1933, 1: 48-69.

¹⁶ B. L. Wellman, "Growth in Intelligence under Differing School Environments," *Jour Exper Educ.*, 1934, 3 59-83.

doubtedly was responsible for a "depression" of something like 100 I.Q. points. This is the case of Edwin, the boy mentioned in chapter three, whose thyroid deficiency was not discovered by his highly intelligent parents until it was too late for remedial treatment, and who as a cretin is now spending in an institution for defectives a life which might well have been spent in normal happy play and fruitful work. Had even one of these parents learned in college certain simple facts about myxedema, this tragedy, considering the intelligence and devotion of these particular people, would probably never have happened. Yet such facts, the author cannot resist adding, are usually not included in books on child psychology, as being physiology or applied medicine — not "psychology."

The studies that have been cited do unquestionably afford irrefutable arguments for the general importance of heredity in determining differences in intelligence. But they show equally clearly that in some cases environmental factors are very important, and above all that in every individual child intelligence is a matter of both heredity and environment. Thus the real problem is not whether intelligence is hereditary *in general*, but to what extent *differences* in intelligence from individual to individual are due to hereditary or to environmental differences.

Not only is the doctrine of inherited intelligence illogical; it is also, in so far as it may lead either to a fatalistic or to an over-optimistic attitude toward any one child, misleading. In one child hereditary factors may be more important in determining the developed trait, in another, environmental factors. For example, in one an I.Q. of 60 may possibly be due largely to an inherited defective cortex, while in another child the same I.Q. may be due to malnutrition in infancy. In one child an I.Q. of 85, indicating "dullness," may be due to hereditary conditions different from normal, while another child may make an I.Q. of 85 rather than 100, because he has lived in a social environment much inferior to the average. Each child must be judged as an individual. An I.Q. carefully obtained will, if conditions are favorable, and especially if the same result is obtained in a succeeding year or years, give a rough measure of his present intelligent capacity as compared with that of other children

of his age. But it will not tell what the I.Q. might have been had other environmental conditions prevailed since conception. Nor will it in all cases enable us to predict future intelligence status. The I.Q. is roughly constant from year to year, but there are many individual exceptions.

We said that the assumption usually underlying the putting of the question "Is intelligence hereditary?" is that "inherited traits" are difficult or impossible of reform. Such an assumption, in the light of our discussion and the actual studies reported, is meaningless. It is worth while, and in some cases very important, to find out to what extent the development of traits may be influenced by hereditary or environmental differences, for such knowledge will influence our method of dealing with individuals. For example, knowing that an unfavorable environment may depress the I.Q. considerably, we shall be anxious to give all children the best possible chance, providing for example for adequate nutrition, especially during the prenatal period and early infancy. Having found that some types of mental defectiveness depend on germinal factors, we shall discourage procreation of individuals "carrying" these defects. Having found that fear comes to be aroused in special situations because of peculiar individual experiences, we shall try to guard children against such experiences. And so on.

Meanwhile we must remember that idiocy acquired as a result of a birth-injury may be just as incurable as "inherited" idiocy, that an acquired habit of lying is as difficult to deal with as an inherited tendency to cry aloud whenever hurt. Not merely acquired traits, but traits in which hereditary factors are important are susceptible of control — of eugenic or remedial medical control, if not of control through training. In short, modern psychology offers no excuse for a fatalistic attitude toward individual human traits or toward intelligence — it merely points to the need for careful analysis and accurate knowledge as a basis of control.

THE DISTRIBUTION AND DEVELOPMENT OF GENERAL INTELLIGENCE

The "general intelligence" which is revealed by intelligence tests is distributed in the same manner, in the gen-

eral population, and develops in the same general manner, as the various special abilities discussed in the preceding chapter. But the curves are likely to be more regular since they are usually based on composite scores of a number of tests. Figure 16 shows a typical distribution of Binet I.Q.'s for a group of 456 children aged eight to 16 years.

On the basis of such curves as this we make the important generalization, not current before the days of modern experimental psychology, that there is, save for certain abnormal cases, no sharp line between the varying degrees of intelligence, no well marked types of intelligent individual. The very bright person, even the genius, is not a

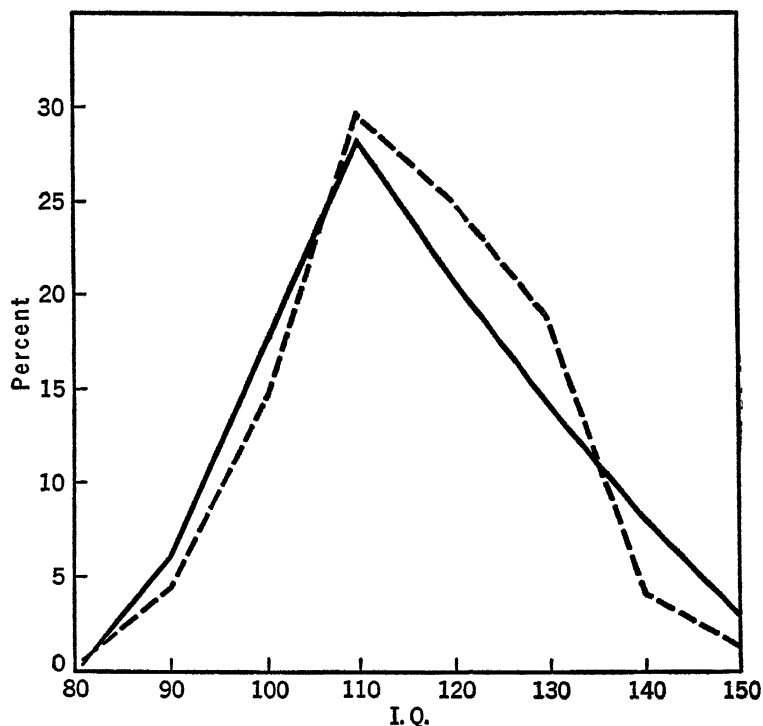


FIG. 16. DISTRIBUTION OF BINET I.Q.'S FOR 456 SUBJECTS
AGES 8 TO 16 ENROLLED IN THE UNIVERSITY OF
CHICAGO LABORATORY SCHOOL

From Freeman and Flory, "Growth in Intellectual Ability as Measured by Repeated Tests," *Monogr. Soc. Res. in Child Develop.*, 1937, 11, 2.
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peculiar being qualitatively different from the rest of his kind. He does the same things that other people do, discriminates and learns and thinks in the same way that they do. But he does these things on the whole much more effectively than they. There are a very few children born who, if they live and are able to fulfill their talents, will rank in intelligence in the top one hundredth, still fewer in the top thousandth, of the general population. But close to these extremely gifted individuals are more — a few more — who are also very gifted. Just as in the case of height or in any other common biological trait, we find most people clustered about a central mean, and the further we go away from that mean in any direction, the fewer individuals we find possessing the greater or smaller degree of intelligence.

Corresponding to the few very intelligent individuals we have a very few extremely unintelligent individuals who for one reason or another perform very ineffectively the various tasks called for by the tests. A very few of these who are the products of abnormal hereditary or environmental conditions, are unable even to talk or feed themselves. Others very low in the scale can perform, in a low degree, the various tasks called for, and ranking near them are more individuals who can do the tasks better. We find an increasing number having the higher degrees of intelligence until we reach the average again. We have thus an unbroken series of steps. The idiot, the imbecile, the moron, and the dull normal no more represent distinct types than the genius.

How does general intelligence as measured by the tests grow during childhood, and when does this basic growth cease? Do bright and dull children grow in mental stature at the same rate? And may a child who is bright in early life become dull later, as popular lore assumes? A brief consideration of the rate and limits of intellectual growth will enable us to give fairly adequate answers to these questions. In figure 17 are given some typical curves showing growth in I.Q. What do they mean?

In the first place such curves mean that general intelligence (and remember we are speaking here of the ability to pass tests, not of the hypothetical something that underlies it) increases regularly from the time we can first measure it

to maturity. There has been much discussion by the experts as to the normal rate of mental growth. A good many psychologists have argued, on the basis of such curves as given in the figure, that intellectual growth is much more rapid in the first years, like physical growth, and then continues gradually to decline in rate until the curve flattens out. In other words, the curve is thought to be negatively accelerated. There are certain reasons for doubting this. In the first place, as we shall indicate later in this chapter, we do not yet have dependable measures of intelligence for the first two years.

In the second place it is quite possible that some of the

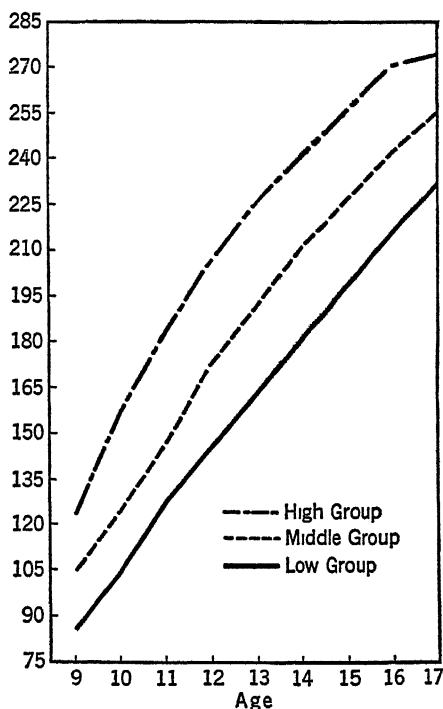


FIG. 17. MEAN INTELLIGENCE TEST SCORES OF THREE GROUPS OF PUPILS WITH CONSECUTIVE VACO TESTS FROM ELEVEN TO SIXTEEN YEARS

From Freeman and Flory, "Growth in Intellectual Ability as Measured by Repeated Tests," *Monogr. Soc. Res. in Child Develop.*, 1937, II, 2.
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"negative acceleration," or slowing down, which has been found in many curves in the past, has been due to the kind of tests used or the make-up of the groups tested at particular ages. Longitudinal study, based on repeated measurements of the same individuals by the same tests, has not been used in most of the older studies. Recent curves using this method, and also utilizing tests in which indefinite improvement is possible, suggest two significant generalizations — first that mental growth tends to be linear, to go on at the same rate throughout childhood; and second that it continues past the time (14 to 16 years) which has for a long time been considered to mark the peak of mental growth.¹⁸

Curves in Figure 17, based on a reliable and valid composite intelligence test (the Chicago VACO test), illustrate

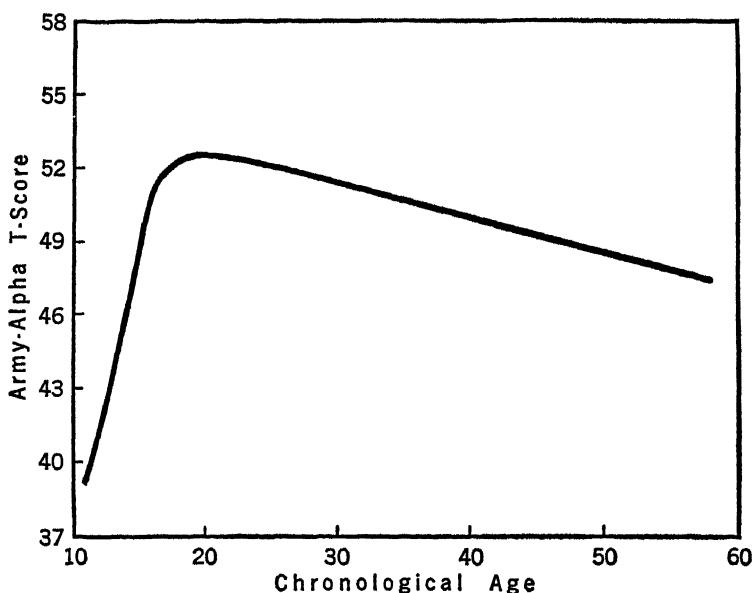


FIG 18. SMOOTHED CURVE OF GROWTH AND DECLINE OF ARMY ALPHA TEXT SCORES FOR 1191 SUBJECTS AGES 10 TO 60

From Jones and Conrad, "The Growth and Decline of Intelligence," *Genet Psychol. Monogr.*, 1933, 13, 3. Reproduced by permission.

¹⁸ F N Freeman and C. D Flory, "Growth in Intellectual Ability as Measured by Repeated Tests," *Monogr. Soc. Res. Child Develop.*, 1937, 2, pp. 116 See also F N Freeman, *Mental Tests*.

both these points. It is unlikely that the curves which continue to rise steadily to 16 years and 17 years will suddenly become horizontal. Growth, we might predict, will continue beyond these points, and then decline gradually. A study by Jones and Conrad, using somewhat less "good" tests (the celebrated but now rather outmoded Army Alpha, the verbal tests used during the World War) and not employing the longitudinal method, but, testing some 1191 unselected rural subjects, is in line with the Chicago study.¹⁹ Figure 18 indicates linear growth to about 16 years, with a negative acceleration beyond 16 and a peak between 18 and 21, after which we have the long flat period of no increase and gradual slow recession, of adult life.

Figure 17, based on the average of repeated measurements of three groups of subjects in the Chicago study (those subjects ranking in the lower third, middle third, and top third of a total of 122 subjects), also throws light on another disputed point in the field of intelligence testing — namely whether bright and dull children develop at the same rate. In traditional theory the dull children not only develop at a slower rate, but mental growth ceases at an earlier age than for bright children. If that were true of this group the curves should diverge increasingly with age. But they do not. Moreover the low group keeps on improving just as long as the high group. Figure 19 indicates linear growth, with slight increase in divergence, for superior and average children. Other studies support the last conclusion, that the dull and backward children continue to grow mentally as long as the others,²⁰ although in some studies the rate of increase of dull or very dull children seems to decline.²¹ It is possible that children who are merely dull grow intellectually at the same rate as bright children, but that extremely dull children grow at a slower rate. We really cannot arrive at a satisfactory position on this point

¹⁹ H. E. Jones and H. S. Conrad, "The Growth and Decline of Intelligence: A Study of a Homogeneous Group between the Ages of Ten and Sixty," *Genet. Psychol. Monogr.*, 1933, 13: 223-298.

²⁰ For example, the author's study of very bright and very dull children referred to the last chapter.

²¹ F. Kuhlmann, "The Results of Repeated Mental Examinations of Six Hundred and Thirty-Nine Feeble-Minded over a Period of Ten Years," *Jour. Applied Psychol.*, 1921, 5: 195-224.

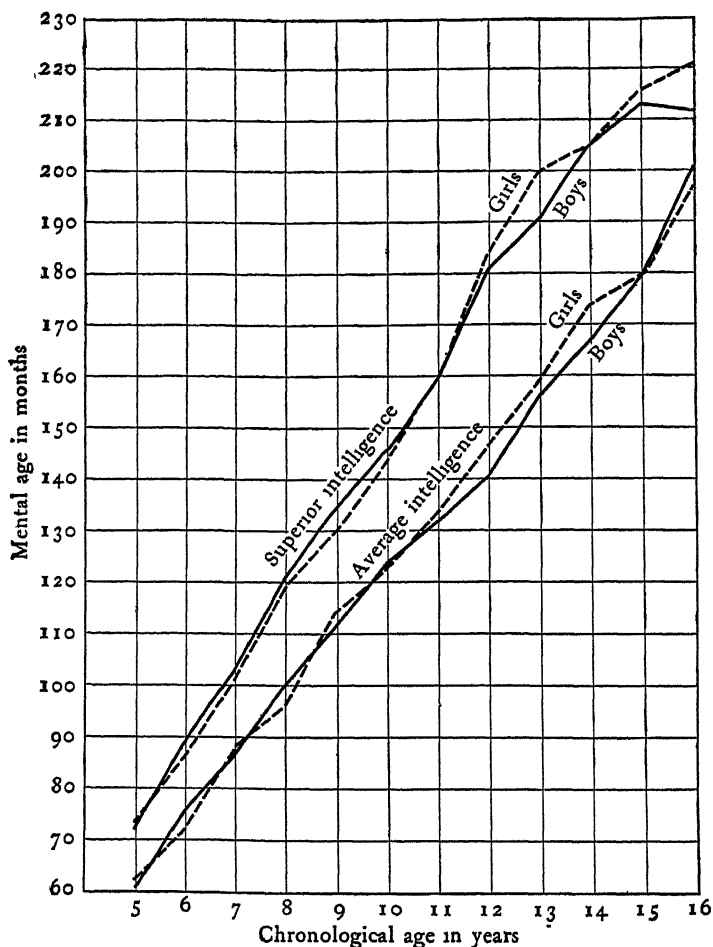


FIG. 19. GROWTH IN MENTAL AGE AS SHOWN IN CONSECUTIVE STANFORD-BINET TESTS OF TWO HUNDRED AND SEVEN AVERAGE AND SUPERIOR CHILDREN

The two upper curves represent children with *I.Q.*'s above 110, the two lower curves children with *I.Q.*'s between 90 and 110. The continuous lines represent boys, the broken lines, girls. (Data from Baldwin and Stecher, "Additional Data from Consecutive Stanford-Binet Tests," *Jour. Educ. Psychol.*, 1922, 13 : 556-560.) Reproduced by permission.

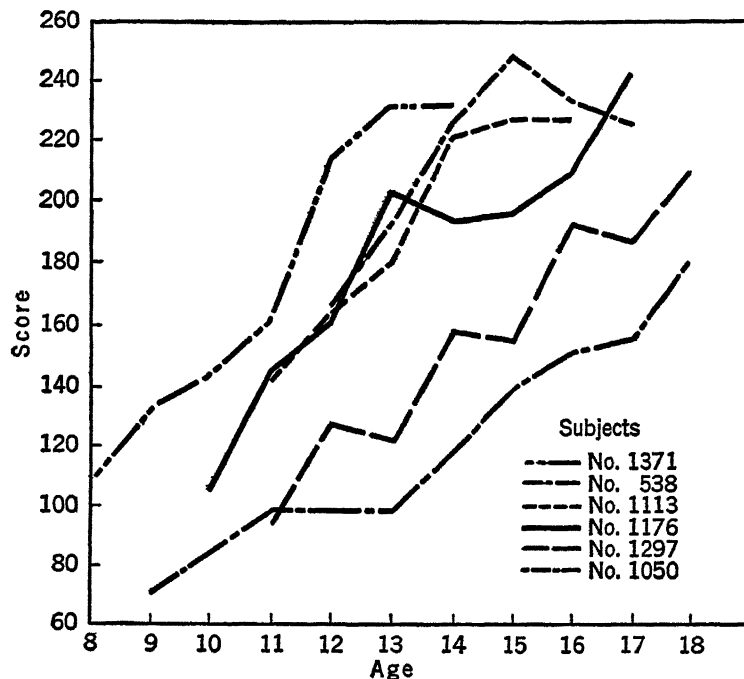


FIG. 20. A MISCELLANEOUS GROUP OF INDIVIDUAL GROWTH CURVES OF SIX SUBJECTS

From Freeman and Flory, "Growth in Intellectual Ability as Measured by Repeated Tests," *Monogr. Soc. Res. in Child Develop.*, 1937, II, 2.
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until more data are accumulated, especially by the longitudinal method. In any case we know that the dull children *do keep on growing* mentally — there is no evidence for an actual arrest of development in normal children during childhood, as popular theory sometimes holds. Bright children do not suddenly, or gradually, become dull children.

The Constancy of the I.Q. — A related question which is important from a practical point of view is whether the curves of mental growth for individuals tend to conform to the average curve. Is there steady and consistent progress in individuals? The answer to this question must be "Yes, on the whole." If normal conditions prevail, a child will grow steadily in mental ability throughout childhood.

Moreover we may predict that his growth with respect to other children will be consistent. He will tend to maintain his place in the group of children of his age. If he ranked low at five, he will rank low usually, at nine or fourteen. If he makes a high score at five, he will tend to make scores of about the same "height" at later years. This will be true *on the average* in spite of the occurrence of numerous temporary fluctuations in mental growth for each individual. Figure 20 illustrates this consistency and this fluctuation graphically.

A numerical measure of consistency is the correlation between I.Q.'s of the same group of children at different ages. Many studies using various tests have shown high positive correlations, but never extremely high or perfect correlations. Thus we have what is known as the "constancy of the I.Q.," a constancy which is rough, to be sure, but which nevertheless is an indication of stable underlying individual differences in intelligence and its development.

It is important to remember that some tests furnish I.Q.'s that are more constant than others, and also that in certain age ranges it is easier to get a reliable I.Q. than in others. We cannot go into an analysis of the various tests and the reasons for variation with age. But in view of the amount of attention given in recent years to infant tests we should like to point out that most of the "developmental items," (sitting up, grasping cubes, etc.) which have been used as "intelligence tests" for the first year, have been found to have no significant relation to later scores on really reliable intelligence tests. In a study by Nancy Bayley when standard tests were applied to 49 young children at regular monthly intervals from birth to three years, it was found that although there was a high correlation between tests at successive months, even over a two months' interval the correlations drop. And, "there is *no* significant relationship between a child's scores in the first three months and those he makes after nine months . . . or between his average score in months seven, eight, and nine and his performance in the third year."²²

²² N Bayley, "Mental Growth During the First Three Years," *Genet. Psychol. Monogr.*, 1933, 14 1-92. See also P. H. Furfey and J. Muehlenbein, "The Validity of Infant Intelligence Tests," *Ped. Sem. & J. Genet. Psychol.*, 1932, 40: 219-223

Thus we seem to have no present means of measuring the growth of "intelligence" reliably in the first year, and any tests for the first three years must be regarded critically.²³ This consideration should influence our reaction to theories of the rate of mental growth from birth on, as well as our judgment of individual children.

The fact that the I.Q. is only roughly constant and that there are many fluctuations and sometimes very marked changes in intelligence level over a period of years, should lead us to be very careful indeed about drawing conclusions about the capacities of an individual child as revealed by tests. Not only are the tests imperfect instruments, but the actual capacity of a child to respond to test situations may be changed — increased, or lowered — not only by continued exposure to a favorable or unfavorable environment, but by special remedial training or by operative or other medical procedures.²⁴

One illustration from a case known to the author will suggest how an intelligent skepticism about the I.Q. may benefit a normal child. Robert N. — was a healthy normal child of superior parents. Before the age of three he suffered two severe and lasting illnesses which seemed to leave him "nervous," although he was happy and active. He had outbursts of temper "for no reason," and although very devoted to other children and older people, was so sensitive that he sometimes became actively antagonistic to them, bursting into tears and hitting them, and being very sorry afterward. He started nursery school at three, where the teachers found him lovable but so poor in motor coördination that such ordinary activities as cutting, bubble-blowing and the like were hard for him.

Robert continued, too, to have frequent illnesses, and perhaps partly for that reason had great difficulty in playing

²³ See G P Driscoll, *The Developmental Status of the Preschool Child as a Prognosis of Future Development*, Teachers College, Columbia Univ., 1933, Child Develop Monogr No 13

²⁴ S A Kirk, "The Effects of Remedial Reading on the Educational Progress and Personality Adjustment of High-Grade Mentally Deficient Problem Children — Ten Case Studies," *Four Jour Res.*, 1934, 18 140-162 E A Doll, W M Phelps, and R T Melcher, *Mental Deficiency Due to Birth Injuries*, Macmillan, 1932. E E Lord, "A Study of the Mental Development of Children with Lesion in the Central Nervous System," *Genet. Psychol Monogr*, 1930, 7 365-486.

games with other children, although he showed a strong desire to do so and often tried. He became shy, and preferred more and more to stay on the side lines. He talked very little and his speech was rather infantile and poorly articulated. His intelligence quotient at the age of three years was 79, putting him in the border-line group between dullness and feeble-mindedness according to the prevailing standards. The nursery school authorities tactfully and sympathetically conveyed to the parents the suggestion that Bobby was subnormal mentally, and made suggestions for developing him in other ways — he showed real ability in modeling — as well as for making the most of his intelligence. When Bobby was nevertheless started in an excellent small public school at the age of six, he seemed unable to grasp the meaning of the work with words and numbers which was being carried on, in spite of much individual attention from gifted teachers.

As Bobby started school the next year his relatives were profoundly discouraged, but one of them, a school teacher aunt to whom Bobby was devoted, had read enough psychology to be skeptical of the I.Q. in spite of the poor school performance. Working on the theory that Bobby was doing poorly in school as well as on the tests because of a deep emotional inhibition, she tried in various apparently casual but clever ways to develop self-confidence in the child as well as to make him forget his backwardness in his interest in playing some absorbing "game." The family co-operated. By the end of his second year in school Bobby was reading as well as the average child in his class! During the next few years he maintained his position in reading and even gained. But his chief interest was arithmetic, in which he actually ranked at the head of his class over a period of years. Bobby's I.Q. rose as his educational achievement did. At the age of nine his Stanford-Binet I.Q. was 124. His health had steadily improved, as well as his motor coördination. He had warm friends, and was a happy child, full of eagerness for new knowledge, anxious to become grown-up and do big things. Had the earlier verdict about this boy's intelligence level been accepted, he might well have become a non-reader instead of a

slow reader²⁵ — he might even have remained a “dull child.”

Bobby is not a rare exception to an almost universal rule. Even the statistics, correlations being far from perfect and especially low over periods of years, would lead us to expect a good deal of irregularity in the development of individual children. There are a great many children who are being helped somewhat as Bobby was, or who could be helped. On the other hand parents should remember what all teachers know, that there is a wide distribution of natural intelligence, and that hence most children can not be expected to improve their I.Q.'s significantly.

This does not mean that dull children will not improve from year to year or that education is not so important for them. As a matter of fact even after the “physiological limit” of basic special or general abilities is reached for any one age, or for life, at the time of maturity, an individual may develop indefinitely along other lines. For example, after a person has reached physical maturity and undergone practice until he can no longer increase his scores on tests of pitch or rhythm and the like, his basic *ability* can no longer be increased. But his knowledge and appreciation of music, and his skill in piano-playing, may increase so much as to change him from a dilettante to a master.

Social maturity is a matter far more of experience than of heredity, and there are no definite limits to the understanding and appreciation of other human beings which a particular individual may acquire. Mental age, representing the limit of attainment in a number of abilities, does not increase after maturity. But, using the abilities he has, and acquiring knowledge and skill in various ways, a person's general ability to deal effectively with the world may increase greatly after the limits of structural growth have been reached. And this applies to children of any age. Even extremely dull children may develop far beyond what most people would expect of them.²⁶

²⁵ M. Monroe, *Children Who Cannot Read*, Univ of Chicago Press, 1932.

²⁶ S. P. Davies, *Social Control of the Mentally Deficient*, Crowell, 1930; C. G. Aldrich, “Lessons in Child Training Gleaned from Idiots,” *Child Develop.*, 1932, 3 75-80; C. G. Aldrich and E. A. Doll, “Comparative Intelligence of Idiots and Normal Infants,” *Ped Sem. & J. Genet. Psychol.*, 1931, 39 227-257. See also other articles by Aldrich

Yet there are, undeniably, very wide differences in intellectual ability. There is dullness which cannot be changed into brightness. An important lesson which intellectually superior parents should learn is that there is no guaranty that all their children will be bright. Every individual possesses a great many different germ cells, representing different combinations of his ancestral traits, and there is no telling which two cells, in a given mating, will be the ones to give rise to the new individual. According to the laws of heredity, bright parents, therefore will often have dull children, and dull parents will often have bright children. Although there will be a greater proportion of bright children in matings where both parents are bright, the absolute number of bright children who will be born in the next generation to average parents, will be far greater than the number born to bright parents. This is because there are a great many more average than bright people in the world. H. S. Jennings said, "Other things being equal, members of a given family will be more alike in mentality . . . than are persons taken at random, and this independently of the fact that members of the same family have similar environments." But "from the great mass of mediocre parents arise more superior offspring than from the few distinguished parents."²⁷

Hence wise parents, once there is clear evidence from various sources that a child is not so bright as many others, will accept the situation unemotionally. In case no special handicap exists, and there is no improvement in I.Q. over a lapse of years even under the most favorable conditions, parents will then realize that their child is simply dull, or average, or merely fairly bright, and will deal with him lovingly and appreciatively according to his needs, taking the greatest care never to let him feel any disappointment they may have.

Very defective children for their own good as well as that of the family should be in an institution, in the opinion of the author, but merely dull children are capable of leading rich and satisfying lives, and of being very likable and socially valuable people. Any kind of socially useful work is good and can be done well and enjoyed. Very dull chil-

²⁷ H S Jennings, *Biological Basis of Human Nature*, Norton, 1930

dren cannot become doctors or lawyers or teachers, but they can do other sorts of work well. They may even excel in some field not depending largely on abstract reasoning power, such as music.

As for the mass of children who cluster about the average, they are to be the people, that is all there is to it, and we must make of them as good, as effective, and as happy people as we can. Parents are still trying, in spite of all that the child psychologists have said, to force children of average or less than average ability through college and into professions, against their will and at great cost to the children. When we learn to leave these children alone, to provide a rich and happy environment and then to let them become what they can and will, we will see, in the author's opinion, how fine ordinary lives can be, when lived under the best conditions. We may recall that whenever a child or grown-up is given special training in any ability, he is likely to improve. Most people live far below their level of ability — many people pitifully far below.

It is not an easy thing, however, even for people who have the money as well as the necessary insight, to provide for a child of average or less than average intelligence the sort of social environment which we have suggested is desirable for him. For in our present competitive and money-loving society personal success in the form of a well-paying job and a "good" social position are the things most highly valued — and to get them the sort of intelligence that is measured by the tests often helps — the more the better.

A father recently talked with the teacher of his little girl in the first grade, inquiring about the child's progress. "Your child has superior intelligence," the teacher said. "She is already reading like an adult, and I am very sorry she is, for she is not playing as freely with the other children as I would like." In this child's class the pupil most admired by the other children is a little girl who draws very good pictures. "Irene is the best one in our class," says the little girl who reads so well. She often brings home pictures which she and Irene have produced together. The favorite subject of the good reader, by the way, is woodwork, and she says she wants to work in a chair factory when she grows up.

If the appreciation of æsthetic and of manual, as well as intellectual activities, and the coöperativeness and social responsiveness that are encouraged in this unusual class room were general in our society, and if in addition the severe economic handicaps which are so widespread could be minimized, children of varying degrees of intelligence could have something like the kind of opportunities for development which the author would wish for them. As it is, she predicts that even the rarely favored little children in this class room will soon, under the overwhelming social pressure that surrounds them, cease to value as they now do the artist and the artisan. They will, nearly all of them, become either go-getters or would-be go-getters.

When parents do find that they have a child blessed with the precious gift of high intelligence, they will want to develop it to the utmost, and they will experience rare joy in seeing it grow. But they must not think that such a child will attain success and a rich life whatever the circumstances, or that his genius will thrive on adversity. If he is to realize his intellectual promise and if he is to live happily and usefully with other people, he will need all that his parents can give him of loving care and of wise and objective guidance. He must not be treated like a rare exotic product likely to be puny and queer and moody — a genius, a being different from others — but as exactly what he is, a normal child.

There is an embarrassment of riches in this field, hence we shall name only a few books. Besides the treatments referred to in the body of the chapter, including Terman and Merrill's *Measuring Intelligence* (1937), the student will want to have at least a general familiarity with Gesell and Thompson's *The Psychology of Early Growth*, 1938 (this replaces Gesell's early book, *The Mental Growth of the Preschool Child*, which is a manual of testing as well as an interpretative book), *Gifted Children*, by Leta S. Hollingworth, and chapter 20, "The Feeble-minded Child," by Rudolf Pintner in the *Handbook of Child Psychology*. . . In addition to such books as Davies' *Social Control of the Mentally Deficient*, referred to in the text, the student will be greatly interested in a monograph by W. R. Baller, "A Study of the Present Social Status of a Group of Adults Who, When They Were in Elementary Schools, Were Classified as Mentally Deficient" (*Genet. Psychol. Monogr.*, 1936, vol. 28, 1-80). . . A very interesting book on a mountain region in Virginia where poor intelligence is associated with an impoverished environment is *The Hollow Folk*, by Mandel Sherman and Thomas R. Henry (Crowell, 1933). . . Since this edition was prepared a lively controversy has arisen over the "Iowa studies" by Wellman and others which illustrate the influence of environment on the I.Q. These studies, like most others in the same field, embody some faulty treatments. But they rest on a body of important fact, and call attention in an arresting way to fluctuation in the I.Q. the existence of which has long been known to specialists in the field, but the social significance of which has not been adequately appreciated. We now have as the most important publication dealing with these issues the Thirty-ninth Yearbook of the National Society for the Study of Education, under the title *Intelligence Its Nature and Nurture*. There are two volumes of this, Part I, *Comparative and Critical Exposition*, and Part II, *Original Studies and Experiments* (1940).

CHAPTER VIII

PERCEPTUAL-MOTOR LEARNING: THE CONDITIONED RESPONSE

As JOHN FISKE long ago pointed out in a famous essay,¹ the helplessness of the human infant as compared with the young of animals is correlated with a much greater capacity for learning than any animal possesses. The fact that the baby has so few fixed modes of response, and exhibits such a wealth of unorganized, not immediately adaptive activity, means that his behavior is capable of modification in almost endlessly varied ways. He will very soon take on new modes of response. He will begin to act, to feel, to talk, and to think in the most complex ways. The effectiveness of this learning will depend partly upon the capacity of the individual child, and partly upon the type of training and education which he receives. The infant mind is not, as Locke thought, a fair white sheet of paper, nor are all minds at first alike. But the form which mental adjustments take, as well as the degree to which mental activity is effective, is certainly closely dependent upon the specific experience of the individual organism.

From a practical as well as a theoretical point of view it is important to try to distinguish between changes in capacity and behavior which are the result of maturation, and changes involving genuine learning. In the preceding five chapters our emphasis has been upon the rôle of maturation or physical growth in the development of children. This process Marquis has defined, in a stimulating essay, as a "modification of the organismic pattern in response to stimuli present in the intercellular and intracellular environments which at the given moment are independent of external influences."² Maturation thus defined includes changes in behavior due to mere increase in bodily size and strength. For example, when the baby first holds his head up, it

¹ John Fiske, *The Meaning of Infancy*, Houghton Mifflin, 1909.

² D. G. Marquis, "The Criterion of Innate Behavior," *Psychol. Rev.*, 1930, 37 : 334-349

vacillates markedly, but in a few weeks he holds it up steadily. Infants of four months, if placed in a sitting position, almost invariably topple over when support is withdrawn; but by the age of eight months practically all babies can sit alone without support. Growth in size and strength of particular muscles seems to be at least in part responsible for these changes in capacity.

But true learning results in changes of capacity or behavior which occur when a particular environmental situation is present, and *so affects the organism* that its later capacity or behavior is definitely different from what it was before this effect was produced. The environmental situation in learning is, as we shall see, usually complex. It may involve chiefly internal or chiefly external stimuli, or both. But it always involves a retention of the effects of past experience in such a way as to modify later behavior.

For the sake of convenience we shall divide the subject of learning into topics or "types of learning," on the basis of the kind of behavior that predominates. We may call learning in which overt or implicit motor and glandular response to present stimulation predominates, sensory-motor or perceptual-motor learning. This would include what is ordinarily known as the conditioning of responses, both implicit and overt, and also the acquisition of complex habits. In both these types of learning ideas, perceptions, and thinking play an increasing part, from early childhood to maturity, but the activity is *predominantly* perceptual-motor in character.

There is, therefore, no sharp division between this sort of learning and ideational learning or meaningful learning, which is a heading under which we shall deal with the acquisition of speech and of symbolic behavior in the child, and with the activities called perceiving, remembering, thinking, and reasoning. In all of this ideational learning there are perceptual-motor aspects, but we refer to it as ideational when ideas or symbolic activity predominate. As we shall see, learning is often so mixed in content that it is impossible to classify it with confidence under either of our main heads. This is particularly likely to be true of certain problem-solving behavior.

The reader should notice that this classification of learn-

ing is based upon content and not upon the principles of explanation which are involved. There is no assumption that unique principles of explanation hold for any type of learning—nor that the same principles hold for all.

Definition of Conditioned Response.—The traditional conception of conditioned response is that it is a response which has come to be elicited by a substitute stimulus which was formerly inadequate to produce the response. Under the leadership of the great Russian physiologist Pavlov the study of the conditioning of responses (called “reflexes” in Russia) first assumed importance, and the bulk of the experimental work has been done in Russia. Almost the only response studied there was, in the early days, the secretion of saliva. This reflex secretion was found to occur, after some training of the dogs used as subjects, not only when food was taken into the mouth, but on mere sight of the food, or of the food container, or on the sound of a bell or a touch on the shoulder, or almost any stimulus presented at the same time as the food. Here we do have a substitute stimulus eliciting the same response (salivation) as the original “unconditioned” stimulus, though the response may be different in degree (e.g., more or less saliva secreted).

With characteristic energy and a characteristic critical slant American investigators have of recent years taken up the experimental study of conditioning and have added greatly to our knowledge in the field. American studies have made it abundantly clear that in most cases of conditioning where varied responses are used the response which occurs after the learning is not the *same* response. It may be different in degree, as in the experiments of Hudgins,³ who conditioned the pupillary response to the sound of a bell and other stimuli. He found that the mode of contraction of the pupil to the “substitute stimulus” was different—slower for one thing—from that of the reflex response to light. Or the conditioned response may be different in kind, as in the experiments of Warner,⁴ in which rats which had executed a definite quick jump in response to an electric shock

³ C. V. Hudgins, “Conditioning and the Voluntary Control of the Pupillary Light Reflex,” *Jour. Gen. Psychol.*, 1933, 8 3-51.

⁴ L. H. Warner, “An Experimental Search for the ‘Conditioned Response,’” *Ped. Sem. & J. Genet. Psychol.*, 1932, 41: 91-115.

on the feet learned to avoid the shock by jumping in an orderly, rather slow fashion when the buzzer sounded which had preceded the shock during training. Warner's rats also, under varied conditions, made responses different from jumping. Sometimes they merely braced their feet and waited. In one situation where the original response was escape by crawling under a fence when shocked, some rats learned when the conditioned stimulus (sound) occurred to jump over the fence instead.

Such experiments make it clear that the conception of conditioning as the mere substitution of stimuli for the original adequate stimulus is too simple. The response is no mere reflex but a "way out" of a situation, and a way or mode of response which may vary considerably according to the situation. Had psychologists instead of physiologists done the basic work, they probably would have seen this point sooner; for psychologists would not expect that the *same* response would occur when the stimulating situation was different. But the importance of conditioning is not a whit lessened by newer work and newer interpretations. It is still true that a great deal of *relatively* simple learning occurs, where originally nonrelevant stimuli occur along with a situation that does elicit a definite *kind* of response (withdrawing, smiling, etc.). The whipped dog cowers (but does not writhe and run) at the sight of a stick held in a certain way; the burnt child shrinks from the fire (but does not scream in pain).

Importance of Conditioning in Children.—Not until recent years have psychologists come to recognize the significance of this simple type of learning in early childhood. It was experiments on animals and on human adults which first suggested that conditioning is particularly important in children. Several features of the conditioned reflex as determined in these experiments pointed to that conclusion. In the first place, the fact that conditioned reflexes are readily established in very simple animals and that they may be formed in animals after the cerebral cortex is removed,⁵ suggests that they may occur in a very simple stage of human development, namely in infancy.

⁵ E. Culler and F. A. Mettler, "Conditioned Behavior in a Decorticate Dog," *Jour. Comp. Psychol.*, 1934, 18: 291-303.

In the second place, it was found that in many cases the conditioning occurred without awareness on the part of the subject. Examples are the early experiments of Twitmyer, whose subjects were surprised to find their knees bending in a reflex jerk at the sound of a bell, as if against their will; and the success of Cason in conditioning the contraction of the pupil of the eye to a sound in place of a light, with the subjects unaware that the modification had taken place.⁶ Such experiments as these suggest that a good deal of modification of fundamental responses may occur unconsciously in early life.

We should, of course, expect children to forget the origin of responses acquired in the first two years or so; but one might expect that they would remember the origin of responses which they learn to make after they can talk. The experiments, however, make it easy to see that a good deal of such unconscious learning could go on throughout childhood, as in fact throughout life. They also make it easy to see that certain common responses such as fear of the dark or attachment to parents might early be fixated, and so automatically elicited as to seem to the individual inborn.

General experiments on the conditioned response have led to a third conclusion which is important for child psychology, namely, the conclusion that under appropriate circumstances conditioned responses may be attached to any stimulus whatever. Pavlov showed that by presenting food to his dogs simultaneously with various colors, sounds, smells, and contact stimuli of different sorts, any of these would, after a little practice, evoke the salivary reflex. It is of especial interest, from the point of view of possibilities of training, that internal stimuli may serve as conditioned or substitute stimuli. Kinæsthetic stimuli serve this purpose in the experiments in which May and Larson, using a modification of Pavlov's method, trained dogs to react positively to food when the right hind leg was rigidly extended, and negatively when the leg was in any other position.⁷

⁶ E. B. Twitmyer, *A Study of the Knee Jerk*, Univ. of Penn. Ph.D. thesis, 1902, reported by Cason in "The Conditioned Reflex . . . as a Common Activity of Living Organisms," *Psychol. Bul.*, 1925, 22, 445-472; H. Cason, "The Conditioned Pupillary Reaction," *Jour. Exper. Psychol.*, 1922, 5, 108-146.

⁷ E. S. May and J. A. Larson, "Posture-sense Conduction Paths in the Spinal Cord," *Amer. Jour. Physiol.*, 1920, 50, 204-208.

Complex "physiological states" may also become conditioned stimuli. For example, Feokritova accustomed a dog to taking food every thirtieth minute, and then tried the effect of omitting the feeding at some one of the thirty-minute intervals. The result was that at the proper time the secretion of saliva appeared "spontaneously," in the absence of the food.⁸ In other words, the internal physiological state served as a conditioned stimulus to elicit the salivary response. This is the sort of thing that occurs when a three-weeks-old baby, which has been fed regularly every three hours, stirs and begins to make sucking movements or to cry when the three-hour period is up. This behavior may be said to occur because at the end of the customary interval there is a particular internal stimulating situation, including perhaps chemical changes, a certain degree of muscle contraction, and other bodily conditions, and the total bodily situation at this time constitutes the conditioned or "substitute" stimulus.

In the significant experiment referred to above, the findings of which have been confirmed by later experiments, Hudgins was able to elicit the pupillary reflex by sounding a bell; then by a hand contraction (the subject squeezed his hand on a bulb on command, thus closing a circuit and ringing the bell); then by giving a verbal command alone, ("contract!"); then by having the subjects whisper the verbal command; then by having the subjects repeat the command sub-vocally (say it to themselves). In the majority of the subjects the conditioning occurred without awareness on their part—they did not know either the purpose or the results of the experiment. The responses to the verbal stimuli did not lapse nor fail to occur within fifteen days after a period of no training when the new stimulus was "unreinforced" by presentation together with the light: in other words, the usual "experimental extinction" (to use Pavlov's phrase) did not take place. The importance of this work in relation to the achievement of voluntary control is evident.

The fact that any stimulus, external or internal, simple or complex, may become a conditioned stimulus in certain circumstances is, then, another reason for supposing that the

⁸ I. P. Pavlov, *Lectures on Conditioned Reflexes*, Oxford, 1927, 41-42; 103-106.

process of conditioning is very important in early development. Babies as well as young children, in the course of their almost incessant activity, must, it seems, be widely conditioned to constant or frequently recurring features of their environment.

A fourth general finding which is also of great importance for child psychology is the discovery that, theoretically, any response in any part of the body may become attached to a substitute stimulus. Responses in either striped or skeletal muscles, involving overt activity of the fingers, arms, legs, and trunk can be readily conditioned. So can complex responses involving internal smooth muscles as well as skeletal muscles. For example, Krylov in the course of some experiments had occasion repeatedly to give hypodermic injections of morphine to certain dogs, the injection being followed by profuse secretion of saliva, vomiting, and then sleep. After five or six days he found that preliminary operations such as baring an area of skin, wiping with alcohol, and taking out the syringe, were sufficient to produce all of these symptoms.⁹

In the United States, Menzies has recently carried out an experiment on conditioned vasomotor responses in human adults which illustrates the range of possibility in conditioning on both the stimulus and the response side.¹⁰ The unconditioned stimulus was provided by immersing the subject's hand in a jar of ice water or of warm water. The resulting constriction or dilation of blood vessels caused a fall or rise in skin temperature which was objectively measured. Through suitable training these reflex responses came to be elicited by (1) the sound of a bell or buzzer, (2) the subject's whispered repetition of a word, (3) movements and postures of the subject's arm, hand or head, and (4) a visual pattern consisting of illuminated crosses.

There were marked individual differences in ease and retention of the conditioning but in twelve of the fourteen subjects stable responses were readily established to all of these stimuli. They were as readily established in those who were naïve about the experiment as in those who had some insight.

⁹ I. P. Pavlov, *op cit.*, 35, 36

¹⁰ R. Menzies, "Conditioned Vasomotor Responses in Human Subjects," *Jour. Psychol.*, 1937, 4: 75-120

In some subjects merely recalling or thinking about the visual substitute stimulus caused a constriction of the blood-vessels and a lowering of the skin temperature. These results are in accord with those of Hudgins. They are very suggestive not only in connection with the problem of voluntary control but in relation to the possibility of a psychological origin in childhood or later years of nervous internal disorders or illnesses, as well as of various hysterical manifestations.

These and other findings in both the Russian and the American literature of the subject indicate that the internal muscular and glandular responses which are basic in emotion can be conditioned, as well as vital reflexes (digestive, eliminative, and the like) which are important in maintaining bodily health. The fact that fundamental internal responses can be experimentally modified, suggests that "nervous instability" which appears to be innate may in many cases have been acquired. At any rate, considering that all types of response are capable of modification in this way, it is clear that the concept of conditioning may be helpful in explaining the origins of many significant mental traits or conditions.

EXPERIMENTS ON CONDITIONING IN CHILDREN

Until recently only in Russia had really extended and significant experiments been carried on with children themselves as subjects. Most of the published reports are not even now available in translation, but Krasnogorski has published a German report on the work¹¹ and Razran in this country has supplied us with a valuable critical summary of the most important Russian work on children up to 1933.¹² Several Russian articles have recently been published in English in this country. We must content ourselves with a brief description of this work.

It was the physiologist Krasnogorski, a student of Pav-

¹¹ N I Krasnogorski, *Bedingte und unbedingte Reflexe im Kindesalter und ihre Bedeutung fur die Klinik*, Berlin, Springer, 1931, 663-666.

¹² For a valuable and interesting summary and interpretation of the work with animals, children, and adult human subjects see G. H S Razran, *Conditioned Responses in Children - A Behavioral and Quantitative Critical Review of Experimental Studies*, Arch. of Psychol, 1933, No. 148.

lov's, who in 1907 first applied the conditioned reflex method to the study of children.¹³ His general method was to feed chocolate to the blindfolded subjects simultaneously with the ringing of a bell or contact stimulation with a brush. After a few trials mouth-opening and swallowing movements, caused by an accumulation of saliva, occurred immediately on presentation of the conditioned stimuli. The results of this early work indicated that conditioning occurs more readily in bright subjects than in dull subjects; and that the methods used are a reliable means of clinically separating pathological cases in early childhood. Mateer sought to verify these conclusions in this country in an elaborate investigation of more than 50 children aged one to seven years.¹⁴ She used a modified form of Krasnogorski's method, and also gave the subjects standard intelligence tests. She believed that her results did verify the early conclusions of Krasnogorski, and that they also revealed important differences in different age groups and between the sexes. But a critical analysis of the findings, as reported at length in her book *Child Behavior*, does not disclose an adequate basis for her statements. The number of cases in the various age, sex, and intelligence groups is few, the statistical treatment is unreliable, and the interpretations are doubtful at almost every point. Yet her work, as essentially pioneer in character, is of interest and importance as demonstrating the possibility of applying such methods on a large scale.

Krasnogorski himself has worked on steadily. He now studies directly the salivary reflex, instead of mouth-opening and swallowing responses, and employs the most careful means of controlling the experimental conditions and of recording the salivary as well as other responses.¹⁵ Gradually, with the coöperation of students, he has accumulated results which are of great significance for the building up of sound theories of child behavior. For the sake of illustration we may describe briefly the results of one type of ex-

¹³ See A. G. Ivanov-Smolenski, "On the Methods of Examining the Conditioned Food Reflexes in Children and in Mental Disorders," *Bram*, 1927, 50. 138-141.

¹⁴ F. Mateer, *Child Behavior*, Gorham Press, 1918.

¹⁵ The methods now in use were demonstrated to the author during a visit to Leningrad.

periment carried on by him.¹⁶ It had already been found in Pavlov's work with dogs that these animals could be trained to discriminate differences in tones. For example, if food was presented always with a tone of 264 vibrations per second but not with a tone markedly higher, the dogs would soon learn to respond with salivary secretion to the one tone but not to the other. But when the difference between the two tones was gradually shortened so that discrimination was more difficult the dogs showed a tendency to "break down," and to fail to make the well-established differentiations as well as the more recently acquired ones. The breakdown took the form of general inhibition in some animals and of extreme excitement in others. Thus we have in the dogs experimentally induced conditions strikingly suggestive of the manic and depressive types of neurosis in human beings.

Krasnogorski found that children under similar conditions reacted similarly. To take one example, a child of six was trained to respond by conditioned mouth-opening and salivary responses when a metronome was beating at the rate of 144 strokes per minute, but not when the rate was 92 strokes per minute. This was done by always accompanying the first stimulus with feeding and never giving food with the second. When this differentiation was made, the child was taught in four trials to respond to 144 beats but not to 120 beats; but during these trials he began to be irritable. When an effort was made to establish a differentiation between 144 beats and 132 beats, the subject became more irritable and nervous. Moreover, he no longer made even the recently learned differentiation between 120 and 144 beats. During the fourth day's experimenting in the effort to establish the most difficult differentiation (between 144 and 132 beats), the child went to sleep. Because of this non-coöperativeness and "general inhibition" the experiment was then discontinued.

In other series of experiments the difficulty of the task

¹⁶ N. I. Krasnogorski, "The Conditioned Reflexes and Children's Neuroses," *Am Jour Diseases of Children*, 1925, 30 753-768. Some of the results presented in this article are summarized in W. I. Thomas and D. S. Thomas, *The Child in America*, Knopf, 1928, pp 507-515

was increased, not by teaching progressively finer discriminations as in the example given, but by requiring the subjects to react after increasingly long periods of delay. Delayed reflexes are formed by presenting the unconditioned stimulus, not immediately after the beginning of the conditioned stimulus (e.g., sound of bell), but at a definite interval thereafter, let us say 15 seconds. In that case, after a few repetitions of the combined stimuli, the bell alone will elicit the response, not at once, but after a delay of 15 seconds. In succeeding experiments the subject may be trained to respond after longer and longer periods of delay, up to several minutes. But in the course of the training the children began to react in somewhat the same way that they reacted when required to make fine discriminations. In some subjects there was a tendency toward drowsiness, the conditioned reflexes could no longer be evoked, and the children began to sleep during the experiments. In nervous children the effect was more pronounced. One subject, for instance, reacted at first with extreme inhibition, then, in later trials, with marked excitement.

Krasnogorski finds significant differences between normal and abnormal children in respect to their modes of response to these experimentally imposed strains. He suggests that in normal children conditions of inhibition and irritation easily replace one another, according to circumstances, but that in pathological cases the flexibility of the balance is lost. Intensive conflicts between the tendencies to excitement and inhibition, Krasnogorski believes, form a favorable soil for the origin of different neuroses in childhood. "Both physicians and teachers," he says, "must endeavor to strengthen and train the child in forming inhibitory reflexes and in limiting irritation by inhibition from its earliest age, because all discipline and education is an uninterrupted limitation of reaction by inhibition. On the other hand, they have to guard carefully the weak, developing nervous system from the catastrophic conflicts of irritation and inhibition."

By the application of such methods as Krasnogorski has developed we may sometime gain a much more fundamental insight into the origin of nervousness in children than is possible through clinical study alone. The "artificial neu-

roses" created in the laboratory are of short duration and, according to Krasnogorski, leave no undesirable effects. In one sense, as he says, every conditioned reflex is a neurosis. By studying experimentally induced "breakdowns" in simple forms and under controlled conditions in animals, physiologists and psychologists may achieve results that will be highly important in supplementing clinical study.¹⁷ The use of such methods with children seems to the author open to question.

Another student of Pavlov's, Ivanov-Smolenski, has carried on significant experiments with children.¹⁸ He has worked not with a genuine native reflex, but with the learned response of grasping a rubber bulb on sight of food. As a result of many experiments by himself and co-workers he concludes that it is possible by his experiments to distinguish three groups of children: healthy children in whom positive and inhibitory conditioned reflexes are formed quickly and remain stable; children in whom nervous irritation is predominant; and children in whom inhibition is more prominent than irritation.

Some interesting work employing conditioned reflex methods is being carried on at the Leningrad "Institute for Brain Investigation" formerly under the direction of Bekterev. In one of the divisions of the Institute investigations are being made of "associative reflexes" in children of school age, and it is believed that they already throw important light on individual differences and problems of personality in children.¹⁹

Some of these experiments are like our American experiments in the field of memory and learning. Verbal stimuli and responses are often employed, and in this country we should not call the responses reflexes, nor refer to a good deal of the learning as conditioning. It is the impression of

¹⁷ See the reports of recent work being done with animals by H. S. Liddell *et al.*, "A Study of the Conditioned Reflex Method for Producing Experimental Neurosis," *Amer. Jour. Physiol.*, 1936, 116: 95-96; and "Further Analysis of the Conditioned Reflex Method in Relation to the Experimental Neurosis," *Amer. Jour. Physiol.*, 1937, 119: 361.

¹⁸ A. G. Ivanov-Smolenski, *op. cit.* See also the account of his work in Razran's book.

¹⁹ See Razran's *Conditioned Responses in Children* and also abstracts of articles from this laboratory published regularly in *Psychological Abstracts*.

the author, based partly on observations during her week's visit to this laboratory in 1930, and partly on later published summaries of the work, that this research is in an interesting and very promising but essentially pioneer stage, and that as time goes on the investigators will use more effective experimental control and utilize better statistical methods. The growing professional association between American and Russian scholars should be valuable to both.

But the most significant work seen at the Bekterev Institute, from the point of view of the present chapter, was the study of conditioning in infants carried on under the direction of Shchelovanov. One group of subjects seen by the author consisted of ten infants who were living at the Institute with their mothers, having been brought there direct from the maternity hospital. They were to remain until the age of two years, and this made possible observation and experiment under very favorable conditions. Each week a detailed record was made of the behavior of each child over a 24-hour period, a notation being made for each half-minute.

It had been thought during the first Russian experimentation that conditioned reflexes could not be established during the first years, because of the immaturity of the cortex, but more recently both Russian and American work has shown that they may be formed in the early weeks of life. Of the findings about early conditioning only a few may be reported at this point. Denisova and Figurin found that the earliest true conditioned reflex which it was possible to isolate under controlled conditions was the making of rhythmical sucking movements of a definite character while the infant was seated on the mother's lap but before he was given the breast.²⁰ This occurred between three and four weeks of age. Careful tests showed that it was not the odor of the milk, the odor or sight of the breast, the sound of the

²⁰ The following account is based partly on notes taken by the author during a visit to the Institute, but chiefly on an article by M. P. Denisova and N. L. Figurin, "Concerning Conditioned Food Reflexes in Sucking," kindly translated for the author by Mrs. Vera Mintz. This article is one among a large number published in a volume of collected reports of the work in Shchelovanov's division, *Voprosy geneticheskoi reflexologii i pedagogii mladenchestva, sbornik pervyi*, edited by N. M. Shchelovanova, 1929. It is published by Gosudarstvennoe Meditsinskoe Izdatelstvo (State Medical Press), Moscow and Leningrad.

mother's voice, the sight of her face, or the warmth of her body which had acquired the property of eliciting the response, but the complex positional stimulus which must involve a mass of cutaneous, kinæsthetic, and other types of stimulation. The rhythmical sucking occurred when the infant was held in the position for nursing by a man, with face covered, who did not speak. In no other than this definite position did the response appear.

By systematic presentation of auditory and visual stimuli at the time of each feeding from the age of about two weeks on, it was found that conditioned sucking responses to the sound of a bell developed in the beginning or the middle of the second month, and similar responses to a red light appeared at two to two-and-a-half months. In the case of one subject the training began later, at the age of one month and 28 days; and in eight days, after only 48 trials, the conditioned response to the sound of a metronome was established. This suggests that age or "maturity of the nervous system" is as important a factor in early conditioning as number of trials; that is, that it takes more trials to condition a response in a younger infant than in an older one. In a later experiment Kasatkin and Levikova reported the formation in several infants of conditioned sucking responses to organ tones in the first half of the second month. They confirmed the previous finding that it takes fewer trials to condition an older infant.²¹

In the United States Dorothy P. Marquis made an intensive study of conditioning in infants, sounding a buzzer each time the infants were bottle-fed.²² In seven out of eight infants she believed she had established conditioned sucking and mouth-opening responses by the fifth day, and also conditioned decrease in crying and general activity (the latter measured by stabilimeter records — cf. the Ohio apparatus described in chapter three). But it is possible that the decreased activity was simply a natural response to auditory stimulation, which affected older infants more readily. Also

²¹ N I Kasatkin and A. M Levikova, "On the Development of Early Conditioned Reflexes and Differentiations of Auditory Stimuli in Infants," *Jour. Exp. Psychol.*, 1935, 18 1-19

²² D. P. Marquis, "Can Conditioned Responses be Established in the Newborn Infant?" *Ped. Sem. & J. Genet. Psychol.*, 1931, 39 . 479-492.

the sucking movements might have been merely a part of the general activity of infants that age.

M. A. Wenger, however, in a series of very carefully controlled experiments showed definitely that conditioned responses may be experimentally established in some newborn infants.²³ Using tactual vibration as the conditioned stimulus for lid closure (a flash of light was the unconditioned "native" stimulus), she was able to condition the lid closure to the tactual stimulus in three infants on the fifth day. In another series she conditioned a withdrawal response to a mild shock, to a flash of light in two infants on the sixth day. On the other hand, even after eight weeks of training she was unable to condition sucking responses to auditory stimulation.

The conclusion now seems safe that conditioned responses may be established in the first week of life, although there are individual differences and differences according to the experimental stimuli used. Wenger concludes that conditioning in the neonate is unstable and not easily obtained.

A good beginning has been made in American studies of an experimental attack on the conditioning of emotional responses. Watson and Rayner, while they were making the study of native responses discussed in chapter three, were so impressed with the probability that much apparently instinctive emotional behavior is probably conditioned, that they decided to build an experimental fear in the laboratory. In two trials they established a fear of a white rat in an 11-months-old boy, by making a sudden loud noise behind the child's head just as he was reaching out for the animal. This fear was present in mild form a week later, and after strengthening by several more combined presentations of sound and rat, was elicited instantly at the mere sight of the animal. Moreover a transfer to similar situations was made, for the child now reacted negatively also to a rabbit, a dog, and a fur coat. The fear of the rat was still present when a test was made one month later.²⁴

The strength and persistence of what Watson calls "home-

²³ M. A. Wenger, "An Investigation of Conditioned Responses in Human Infants," (In) *Studies in Infant Behavior*, Univ of Iowa Stud. in Child Welfare, 1936, pp 9-90.

²⁴ J B Watson and R Rayner, "Conditioned Emotional Reactions," *Jour. Exp. Psychol.*, 1920, 3 1-14

made fears" may be inferred from the difficulty encountered in the attempt to "cure" them. Mary Cover Jones made interesting studies of the relative efficacy of various methods. She concluded that the only permanently efficacious one is that of direct reconditioning. This is illustrated by the case of the little boy Peter, who was afraid of rabbits. The plan followed was to have a rabbit in sight, but not close by, while Peter was enjoying a good meal. Then at later meals the rabbit was gradually brought nearer, until finally the generally pleasant positive responses which were the rule at dinner time became attached to the animal as a part of the general situation. Finally Peter patted the rabbit and spoke to him, and the fear was gone, not to return.²⁵

Interesting experiments have been carried out in this country in conditioning milder affective responses in children. For example, a child is conditioned against a telegraph snapper by sounding it when vinegar is given.²⁶

H. E. Jones has conducted significant experiments on the conditioning of the galvanic skin response to an electro-tactual stimulus.²⁷ This response, as registered by deflection on a galvanometer, was selected as the unconditioned response to be studied as being the same sort of response that occurs in adult emotional reactions. By presenting the mild shock which produced the response together with a light, a touch, and a variety of sounds, Jones established conditioned responses in three infants from three to nine months of age (and later in five nursery school children). One infant was studied intensively, using a sound stimulus. After conditioning she was retested in subsequent weeks, no reinforcement being given. "On day 48, six weeks after the last reconditioning, the C-R was still present in a very marked form. On day 54 it had not completely disappeared." These experiments were in accord with a number of the Pavlov findings about conditioning in dogs.

These experiments of Jones, considered in connection with

²⁵ M. C. Jones, "The Elimination of Children's Fears," *Jour. Exp. Psychol.*, 1924, 7 382-391. See p. 113 and also M. C. Jones, "The Case of Peter — A Laboratory Study of Fear," *Ped. Sem. & J. Genet. Psychol.*, 1924, 31 308-315.

²⁶ F. A. Moss, "Note on Building Likes and Dislikes in Children," *Jour. Exp. Psychol.*, 1924, 7 475-478.

²⁷ H. E. Jones, "The Retention of Conditioned Emotional Reactions in Infancy," *Ped. Sem. & Genet. Psychol.*, 1930, 37 485-498.

those of Menzies and others who have conditioned smooth-muscle responses in adults, give us factual evidence that emotional responses may be established in early years, and may be retained for a long time. About retention we shall speak later.

The General Features of Conditioning in Children.—Some findings about conditioning animals and human adults are shown to hold true for children also in experiments conducted by Ruth Kantrow²⁸ at the University of Iowa. Using as subjects 16 children between one and four months of age, Kantrow studied unconditioned and conditioned sucking movements, which were recorded graphically through an apparatus connected with the chin. Moving pictures were taken. Careful records were made of the amount of crying and bodily activity during each experimental period. At each feeding period after the infant was comfortably arranged for the experiment there was first a control period lasting from 25 to 75 seconds during which spontaneous sucking movements were recorded. Then a buzzer was sounded for five seconds (the conditioned stimulus). The milk bottle (which up to this time had been held out of sight) was then inserted into the infant's mouth and milk and buzzer were continued for fifteen seconds. Conditioning was considered established when the amount of sucking in the conditioning period was greater than in the control period by a definite criterion. After a subject had learned to make vigorous sucking movements to the buzzer alone, he was tested at each trial after he had been partially fed, for 'experimental extinction,' the buzzer being presented alone for five seconds at intervals of 30 to 60 seconds until no sucking was elicited in three consecutive presentations of the buzzer.

Conditioning was readily established in all of the infants in from one to five days (four feedings a day). The curves in Figure 21 show the average increase in sucking from experiment to experiment, and also the steady decrease in amount of general activity. This decrease in activity was a marked feature associated with the development of conditioning. An analysis of the results showed clearly that the

²⁸ R. W. Kantrow, *An Investigation of Conditioned Feeding Responses and Concomitant Adaptive Behavior in Young Infants*, Univ. of Iowa, 1937, *Studies in Infant Behavior* IV, 13, No. 3.

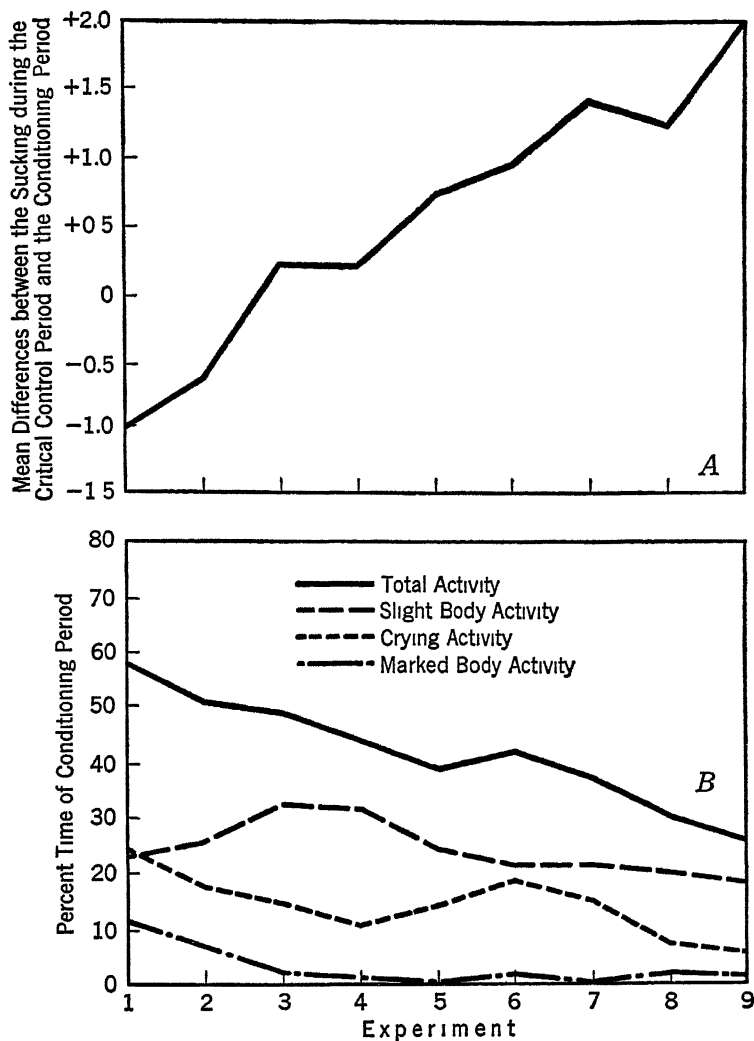


FIG. 21. CURVES OF SUCKING (A) AND ACTIVITY (B) OF FIFTEEN INFANTS FOR NINE CONSECUTIVE EXPERIMENTS

From Kantrow, "An Investigation of Conditioned Feeding Responses and Concomitant Adaptive Behavior in Young Infants," *Univ. of Iowa Stud. in Child Welfare, Stud. in Infant Behavior* IV, 13, 3.

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strength of the conditioned response (reflected in number of sucks per second) was directly related to the degree of hunger. The C-R decreased during the latter part of the experimental feeding periods, and did not appear at all when the infant was satiated.

These findings as to the general form of the conditioning curve, the importance of motivation, and other features, are in accordance with published work on animals and adults. Without going into further detail about the general findings we shall now discuss briefly some of the "conditions of conditioning" as revealed by both animal and human experimentation, which are particularly significant in connection with the training of children. We shall use the traditional terms of the Russian school, indicating briefly how the concepts need supplementing as a result of recent American work.

CONDITIONS NECESSARY TO ESTABLISHMENT OF CONDITIONED RESPONSES

1. *Repetition or reinforcement.* The Russian work indicated that if the conditioned or substitute stimulus, after the C-R has just been established, be applied alone for some time without any "reinforcement" by the original unconditioned stimulus, then the newly acquired response will soon cease to occur.²⁹ This "experimental extinction" has been illustrated in discussing Kantrow's work. In much of the experimental work that has been done the conditioned responses prove to be relatively unstable, and they "die out" after varying periods unless there is retraining. The retention of an experimental C-R for as long as 54 days, as in Jones' experiment, is unusual. If we apply these findings directly to the interpretation of children's behavior, we might suppose that especially in young children there would be very little stable conditioning, since under natural conditions there is little systematic reinforcement. For several reasons, however, we cannot accept this conclusion. In the first place, experiment indicates that it is not necessary for exactly the same stimuli to be combined in later presentations³⁰ or, as we have shown,

²⁹ I. P. Pavlov, *op cit*, pp 48-56

³⁰ See for example R. and D. O. Leeper, "An Experimental Study of Equivalent Stimulation in Human Learning," *Jour. Gen. Psychol.*, 1932, 6 344-376

for the same responses to occur. It is the situations that must be repeated. In the second place, experimental conditioning is necessarily artificial and not long continued. Often the experiment is stopped before genuine learning has taken place.³¹ In the third place, experimenters do not, and must not, apply the powerful stimuli that occur under natural conditions.

We must look to clinical and case studies for illustrations of lasting conditioning; and when we do, we find abundant evidence that as the result of even a single intense emotional or vivid organic experience, a child or adult may be so conditioned that a particular response may occur many years later. Or it may occur during sleep or while the person is unaware of it. Without considering the striking clinical material the reader can summon up convincing examples for himself. There is the child who, after an operation, grows faint at the smell of ether; the adult who once gorged on mashed potatoes and suffered a vomiting spell, and who has never since been able to down them; the woman whose face becomes smiling and tender at the smell of lilies-of-the-valley. Sometimes the original experience is so painful that it is repressed and never thought of. Years later it may recur in full strength. Pavlov and his students noted in their experiments on dogs that sometimes the acquired response is only temporarily abolished, and may reappear "spontaneously" without reinforcement. In fact, Pavlov says, all those conditioned reflexes which have been fully established invariably and spontaneously return sooner or later to their full strength.³² This consideration should lead us to expect exceptions in children also. Mary Cover Jones found in her experiments on curing fears that the little boy who had apparently, through familiarity, lost his fear of a rabbit, showed the fear again in full strength after a month's absence in a hospital.

Thus, and this is a fourth reason why we should not underestimate the amount of conditioning that may occur in children, it appears that "experimental extinction" is not really extinction or loss of the response, but is really due to the learning of another response which supersedes it. This

³¹ W. J. Brogden, E. A. Lipman, and E. Culler, "The Rôle of Incentive in Conditioning and Extinction," *Am. Jour. Psychol.*, 1938, 51: 109-117.

³² I. P. Pavlov, *op. cit.*, pp. 57-59.

statement has received ingenious and convincing experimental demonstration in the important series of experiments by Brogden, Lipman and Culler.³³ It is true, of course, that since the conditioning often takes place on an unconscious level, reinforcement may occur even if the child is not aware that the later experiences have anything in common with the one which produced the original conditioning. Indeed the original incident may have been completely forgotten. The study of clinical cases in which recall of traumatic memories has been induced through hypnosis or other means shows that the original conditioning may be reinforced, and the conditioned emotion made practically permanent, entirely through such indirect means. Nightmares, much-disguised day-dreams, books, pictures, or music—any situations, in fact, which repeat the essential features of the original one—may provide reinforcement.

There is considerable question as to whether or not it is necessary, in order to “cure” an undesirable emotional conditioning, to find out through inducing complete recall, what the original stimuli were, in order to attach to them new and desirable responses. In many cases it seems best to let sleeping dogs lie. But if the sleeping dogs do not lie (if the symptoms are really disturbing) it may be necessary to attempt complete reëducation—preferably, for reasons given in chapter one, under the guidance of a person thoroughly trained in *experimental* psychology (not mere general psychology, not psychoanalysis, not child-study).

Desirable conditioned responses also, either negative or positive, may of course be established, die out, or be strengthened in the ways described. For example, in a child who has in babyhood become emotionally attached to members of his family because of kindly treatment by them, the “bonds of family affection” will become strong and permanent if the kindness continues. Even if it does not continue beyond the earliest years the attachment may remain, sometimes at an unconscious level, because there has been intensive “practice” in these early years. Then, too, through indirect means such as play with dolls, the reading of stories, and interest in any activities which indirectly arouse emotional responses im-

³³ W. J. Brogden, E. A. Lipman, and E. Culler, *op cit*

portant in family life, the basic mechanisms become strengthened. Adults are sometimes surprised, at the death of a member of the family, to see in the intensity of their grief a measure of the love they had thought for years was slight or even lacking.

2. *Relative strength of the stimuli.* A second fundamental generalization from the experiments was that mere simultaneous repetition of two stimuli will not result in conditioning unless the strengths of the two stimuli bear a certain relation to each other. That is, the unconditioned stimulus must be biologically stronger than the conditioned stimulus.³⁴ This accounts for the fact that conditioned responses seem to be most readily and most effectively formed in relation to the most biologically fundamental situations — feeding, mating, defending oneself, and the like. Indifferent responses do not, except under special conditions, become linked to substitute stimuli, and conditioning does not take place in a haphazard way.

The contemporary American statement of this finding is that *motivation is an essential factor in conditioning*. Kantrow could elicit no conditioned responses unless her children were hungry, and other experimenters have found that the existence of a dominant, motivating condition, both in animals and in human beings, is essential to the process. Conditioning is clearly, therefore, not a mere simple linking of responses. It seems to be a process of learning a mode of response that in some way changes or alleviates a need or motivating stimulus.³⁵

3. *Time relationships of stimuli.* A third prerequisite for establishing a conditioned response, according to Pavlov, was that the two stimulating situations must not only overlap in time, but the conditioned stimulus must begin to operate before the unconditioned stimulus comes into action. Krestovnikov found in his experiments that conditioning did not occur if the unconditioned stimulus was applied first and the conditioned stimulus later. To illustrate, with one dog the loud sounding of an electric buzzer, started five to ten seconds

³⁴ I. P. Pavlov, *op cit*, pp. 30, 31.

³⁵ For a stimulating discussion of the bearing of some experiments on this point see O. H. Mowrer, "Preparatory Set (Expectancy) — a Determinant in Motivation and Learning," *Psychol Rev*, 1938, 45, 62-91.

after food was given, failed to establish a conditioned reflex even after 374 trials; whereas when the buzzer was set going before the administration of food only one trial was required before the reflex was elicited by the sound of the buzzer.³⁶

More recent studies have shown that "backward conditioning" can occur under certain conditions, but is more difficult to establish.³⁷ Thus the original statement holds if we modify it to say that the general time relationships indicated are the most favorable ones for conditioning. Considerable experimentation on the time interval is now going on.

This finding suggests significant application to the training of children, especially in the matter of reward and punishment. According to this principle, the reward (stimulus for positive responses), if the process is one involving sensory-motor conditioning, should not precede the act which it is desired to supplant. To assume an illustrative case, suppose a child's infected toe has to be dressed each day. Theoretically if the doctor gives the child candy before changing the bandage it will not be so likely to become associated with or modify the behavior (crying) following the cutaneous stimulation. But if the candy is given during or just after the process it will modify the response, for the rather slight pain or contact stimuli will finally tend to be followed automatically not only by shrinking and crying responses, but also by positive salivary and mouth-closing responses to the candy. Thus the crying may be lessened or inhibited, and on successive days the child may submit to the operation with increasing cheerfulness. In this case the unconditioned stimulus is gustatory (taste of candy), and the reflex responses are secretion of saliva and other positive feeding and emotional responses. The conditioning stimulation is the cutaneous (pain) stimulation involved in dressing the sore toe.

4. *Absence of novel distracting stimuli.* In the experimentation with dogs as well as with children Russian investigators have found that the occurrence of irrelevant or unaccustomed stimuli, such as street noises or the presence of a visitor, serve as distractions temporarily abolishing responses

³⁶ I P Pavlov, *op cit*, pp 26-28.

³⁷ See for example H M Wolfe, "Conditioning as a Function of the Interval between the Conditioned and the Original Stimulus," *Jour Gen. Psychol.*, 1932, 7 80-103.

already conditioned or delaying the formation of new ones. But any novel condition, if it remains constantly present, is likely to be adapted to and the learning goes on as before.³⁸

These findings are related to facts well known to parents. A baby will not respond in the usual way at his dinner table if a stranger is present or a new nurse takes charge of him. Babies are not at their best when company is present, nor when subjected to more or tighter clothing than usual, nor when in strange surroundings.

If we applied what we know about conditioning we should conclude, assuming that we wish a peaceful household and a well-poised child, that for the establishment as well as the continued smooth functioning of the fundamental responses in eating, sleeping, and the like, calmness on the part of attendants and sensible but not mathematical regularity in routine are important. If it is necessary that the baby eat or sleep or sit on his nursery chair while other things are going on in the room, it is usually better to have the other activities a part of the situation from the start if we want him to have regular habits. When he is older he is able to interpret such new situations, and thus learns in various ways to adapt himself. But as a little baby he reacts much as other animals do, behaving for the most part on a perceptual-motor level.

5. *Good physical condition.* Finally, Pavlov points out that if conditioning is to occur readily in his animal subjects, they must be alert and wide-awake, and in good health. In a series of studies Krasnogorski and his students have shown that in young children the physiological state is very important in this simple but extensive learning which is the basis of later mental development.³⁹

Having considered experimental evidence for the importance of conditioning in childhood, and having discussed the circumstances under which it occurs, we may now inquire how prevalent and important conditioning actually is in certain particular aspects of child development, as studied by observers of children.

Applications to the Training of Children.—It is undoubtedly in the period of babyhood, before developed de-

³⁸ I P Pavlov, *op cit*, pp. 45-47

³⁹ I Krasnogorski, *Bedingte und Unbedingte Reflexe im Kindesalter und ihre Bedeutung für die Klinik*, Berlin, 1931, especially pp 663-672

sires and volitions and attitudes enter in to complicate the situation, that the principle of conditioning can best be taken advantage of in the training of children. The baby, the very little child, is plastic as he never will be again, free from antagonistic habits and emotions, a little animal very much under the control of intelligent parents—or at the mercy of circumstances.

1. *The establishment of habits of sleep, feeding, and elimination.* If a baby has been taken up or gently wakened regularly for several days just at the end of a particular stretch of time, so many hours after feeding, then he will normally be active at just about that time. A healthy, well-fed baby, after regular and systematic training, with no exceptions allowed, will not wake up and cry before the proper time. He may awaken, but he will not cry. In this case the substitute stimulating situations are doubtless very complex, including not only kinæsthetic stimuli resulting from changes in tonicity of muscles, but also varied stimuli from organs such as the bladder and the stomach.

Regular bowel movements, too, can be established at least as early as two months, through similar systematic training. The act is first elicited by alimentary stimuli, and is conditioned to postural, cutaneous, and environmental stimuli, so that it occurs at a certain time and place. Many baby books now give directions for such training. The control of the bladder is more difficult and can not be achieved so early, but similar principles have been found to apply. Investigations of such habits as these are now going on in nursery schools and behavior clinics, and it is becoming more and more clear that effective and early conditioning of this sort is desirable as a foundation not only for the physical health of the child but for his mental health.

2. *Conditioning and emotional maladjustment.* Discussions in the early part of this chapter will have suggested how important the conditioning of emotional responses may be not only in relation to the development of particular fears, likings, and aversions, but also in the development of hysterical or psychologically-caused states of poor health, nervousness, and general emotionality.

It is sometimes urged that psychologists now pay too much attention to unfortunate emotional experiences in early child-

hood, overlooking the fact that people may be conditioned in undesirable ways at any age. While adults certainly may be so affected, it yet remains true, in the opinion of the writer, that the childhood experiences deserve our chief attention. Such deep-seated trends are likely to be more widely ramifying than recent ones, since there has been abundant opportunity for association with many experiences which have elements in common with the original traumatic experience. Thus in the process of reinforcement there occurs also reconditioning to other situations, and consequently the trend is likely to become more complicated as the years go by, and more difficult of control.

But the best reason for considering that childhood emotional shocks are more likely to be serious than those which occur later is that they are more readily misinterpreted and "repressed." An adolescent child or an adult is possessed of some wisdom and experience, however crude, which not only give him a certain measure of emotional preparedness, but which he can apply in the interpretation of a traumatic situation when it occurs. Thus by relating that situation to the rest of his experience, he may learn to substitute more rational responses for the first intense emotional reactions.

A child, however, overwhelmed by an entirely novel experience, is much more likely to misinterpret it. Since the situation is not in any effective way linked up with the rest of his mental life, thoughts about it may rather readily form a closed system, not easily aroused to activity by the events of his daily life. Thus, "forgotten" or "repressed," that system, which is represented by physiological "traces" in the organism, remains as a possible source of trouble because it is inaccessible to ordinary thought. Therefore, although the conscious memory of the event is gone, some of the old emotional reactions continue to occur in similar stimulating situations. Thus it is that maladaptive conditioning from emotional experiences in early childhood is likely to have a far more serious effect than similar conditioning occurring later.

We must recognize, however, that since in most cases it is probably through cumulative conditioning or reinforcement that the original situation becomes serious, the conditionings of later years do indeed play an important rôle in the maladjustment of the adult. It seems that sometimes a very great

emotional shock may cause a lasting "neurosis" in an adult whose early experiences have not predisposed him to such reactions; yet general clinical studies as well as recent studies of soldiers who broke down under the strain of war, indicate that in many cases there is evidence of earlier nervousness or instability of some sort. While in some cases this instability may be simply due to hereditary "weakness," in a great many, perhaps in nearly all, it must be interpreted as in part at least the result of specific conditioning, in relation, of course, to other modes of action and of thought peculiar to the individual in question.

3. *Conditioning in other types of mental adjustment.* We have selected for special attention the part which conditioning has been observed to play in the acquisition of fundamental responses to feeding and care and in emotional development. Conditioning is also important, observation of children indicates, in relation to many other aspects of mental life, such as the building of complex sensory-motor habits, perception, speech development, and the formation of motives and social attitudes. Since all of these types of adjustment will be treated in some detail in later parts of this book, we shall not at this point indicate the rôle of conditioning in their development.

The Conditioned Reflex and General Theory.—From the point of view of general psychological theory, the study of the conditioned response has been especially helpful in throwing light on the very early developments which are often, for want of understanding, vaguely ascribed to heredity, instinct, or the "dawn of intelligence." It has had much to do with the discarding of the older instinct-hypothesis, and has forced a reconsideration of the whole question of native emotional differences among individuals, the sexes, and different races. It has furnished a good working explanation of types of behavior formerly explained in blanket terms, and has substituted a clear-cut type of analysis for the vague Freudian theories of repression, infantile fixations, and the like. The conditioned response principle alone will not explain human development, but as one of the relatively simple types of learning it is extremely important. It also has its place, as we shall see, in the explanation of more complex behavior.

SUGGESTIONS FOR READING

Aside from experimental articles there is available for the student little material in English on conditioning. Razran's *Conditioned Responses in Children*, referred to in the text, is of course invaluable. If the student reads German he will find an admirable interpretative treatment of Russian work on conditioning in Krasnogorski's *Bedingte und unbedingte Reflexe im Kindesalter und ihre Bedeutung für die Klinik* (Berlin, Springer, 1931). This book, which contains 61 illustrations and a bibliography listing some English titles, is a systematic interpretation of work on children in comparison with that on adults . . . The late Pavlov's *Lectures on Conditioned Reflexes* to which frequent reference has been made in the text is a stimulating and surprisingly readable book considering its technical character. . . Blatz and Bott, *Parents and the Preschool Child*, gives excellent advice on the establishment of fundamental habits.

CHAPTER IX

PERCEPTUAL-MOTOR LEARNING: COMPLEX HABITS

IDEAS and thinking become more and more prominent in the learning of the child after the first months are past, but certain types of learning seem to occur with a minimum of ideation, no matter at what age the learning occurs. This is not only true of the conditioning of responses but also of the learning ordinarily called habit formation which involves a more or less complex series of acts. This probably differs from conditioning merely in its greater degree of complexity—the basic conditions and characteristics are probably very much the same.

MATURATION AND HABIT-FORMATION

The treatment in preceding chapters has shown that it is difficult to distinguish between maturation and learning. Yet there are, clearly, activities in the development of which learning based on special environmental conditions is prominent. We wish to know what activities are thus learned, and when and how the suitable environmental stimulation can best be introduced. Of course we need to pay attention to the activities which “are going to develop anyway,” because, as in walking, the child may perform these activities in a more skillful and assured way if the best conditions, including freedom for early exercise of the activities, are provided. But the less prominent the maturational factors are the more important is it, we may assume, to control the environmental conditions.

We saw that in the experiments of Jersild and Bienstock which dealt with color-naming, tapping, and reproducing of tones (as well as other items) practice resulted in an only temporary gain over the control group, except in reproducing tones. We saw that early practice was no more effective than delayed practice in the case of Josephine R. Hilgard's

one twin trained in cutting, ring tossing, and walking on slightly raised boards. Similar results on the same pair of twins for cube behavior and stair climbing had been obtained by Gesell and Thompson.

In a later experiment Hilgard obtained the same sort of results for two groups of preschool children equated in initial ability in three skills: buttoning, cutting with scissors, and climbing. The practice group of ten children was given 12 weeks practice in the skills. At the end of this period both they and the ten control children were given four days of practice, then a final test. The one week of practice by the control children was sufficient to bring their scores up to a level similar to that of the group which had had special practice.¹

J. A. Hicks studied the progress of 60 children aged from two to six years in throwing a dart at a moving target.² All the children were given an initial test in throwing at the target (10 trials), and on the basis of this test were divided into two groups of approximately equal ability in the test. The practice group received training for eight weeks, with a weekly test of 10 trials each. Then both groups were given two more tests of 10 trials each, one each week. Every child in the practice group thus threw 110 times and every child in the control group 30 times.

Both groups made a definite *average* gain on the final tests, but only about half of the children made any gain. The average final score of the practice group was slightly higher than that of the control group, but the difference was not statistically significant. Hicks draws the "tentative conclusion that for the development of complex motor skills in preschool children, maturation and a general environment in which many experiences are possible, are much more important than systematic practice."

But on examination of the data this conclusion is seen to be clearly unjustified. Hicks states that some (presumably about half) of the children were near their physiological

¹ A. Gesell and H. Thompson, "Learning and Growth in Identical Infant Twins," *Genet Psychol Monogr*, 1929, 6: 1-123, J. R. Hilgard, "Learning and Maturation in Preschool Children," *Ped. Sem & J. Genet. Psychol*, 1932, 41: 35-56

² J. A. Hicks, *The Acquisition of Motor Skill in Young Children*, Univ. Iowa Stud. in Child Welfare, 1931, 4: 1-180.

limit on the first test—they were already capable of high scores and, considering the nature of the test in relation to their abilities, there was not room for improvement. Again, the control group were given a significant amount of practice, and the curves show that they did improve significantly on the final 20 practice trials. In the third place, although the children apparently continued to be interested and coöperative, the practice seems to have been of a more or less routine character. It was not systematic in the sense of utilizing various possible methods for developing the abilities to the full. We are reminded of the experiment by Wolner and Pyle on pitch discrimination (cf. p. 000).

Finally, even if we granted that maturation is really much more important than systematic practice in this particular ability (which we don't), it is not in accordance with the best scientific method to apply the conclusion to all "complex motor skills in preschool children." Some complex skills may be much more susceptible to training than others. Probably the susceptibility is related to a number of factors, including the nature and complexity of the task, and the kind of training provided.

An example of the differential effect of different kinds of training is afforded by the experiments of Brian and Goodenough who used as subjects 20 preschool children, and measured their progress in tossing rings over a post under different conditions.³ In Group A were ten children who were given no instruction nor criticism with regard to their methods of throwing, but were freely praised and encouraged like the other children. The six children in Group B were given a brief preliminary demonstration, and later verbal criticism as to the types of error made, but were not taught a particular procedure. The four children in Group C, in addition to a demonstration and criticism as for Group B, were taught to follow a definite efficient procedure, and were not allowed to experiment by other methods. In spite of the small number of cases both the records of individual children and the average record of the groups show consistent differences. The improvement during a 50-day pe-

³ F. L. Goodenough and C. R. Brian, "Certain Factors Underlying the Acquisition of Motor Skill by Preschool Children," *Four Exper. Psychol.*, 1929, 12. 127-155.

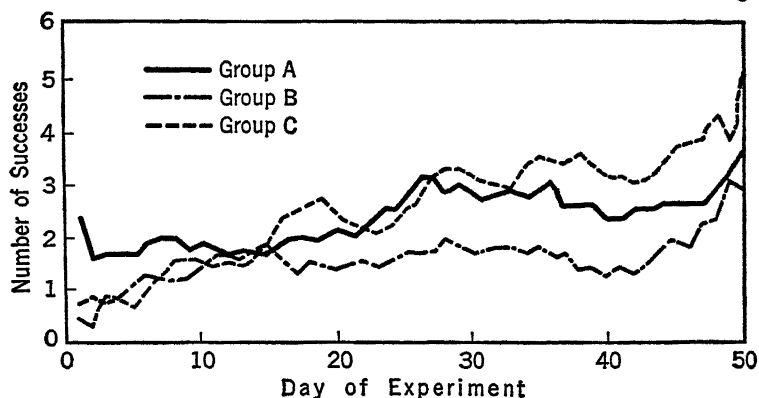


FIG. 22. LEARNING CURVES OF SCORES OF THREE GROUPS OF CHILDREN IN TOSSING A RING

Group A had no instruction, Group B had encouragement and some instruction, Group C had specific training. From Goodenough and Brian, "Certain Factors Underlying the Acquisition of Motor Skill by Preschool Children," *Jour. Exper. Psychol.*, 1929, 12. Reproduced by permission.

riod averaged least for Group A, only slightly higher for Group B, and very much greater for Group C. The group results are shown graphically in Figure 22.

That the complexity of the activity to be learned is a factor in susceptibility to improvement with practice is indicated by an experiment of Marion L. Mattson,⁴ who taught 50 pre-school children to master mazes of three degrees of difficulty, under such conditions that they could not see the pattern of the maze or the blind alleys. The children were divided into equated control and experimental groups on the basis of the average scores for the first four days, I.Q., sex, and chronological age. The experimental group was given an additional 26 days of practice, and then both groups worked at the mazes for eight days. Then there were two months of non-practice for all subjects, followed by a second eight-day test period. There were five practice days a week. The maze was of a sort attractive to children, and they seem to have been well motivated until toward the very last when the interest of some lagged.

⁴ M. L. Mattson, "The Relation Between the Complexity of the Habit to be Acquired and the Form of the Learning Curve in Young Children," *Genet. Psychol. Monogr.*, 1933, 13 299-398.

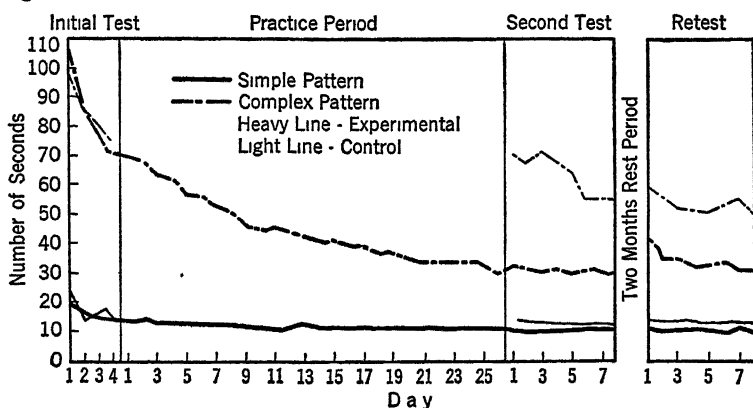


FIG. 23 LEARNING CURVES FOR TIME SCORES IN RUNNING A MAZE

Adapted from Mattson, "The Relation Between the Complexity of the Habit to be Acquired and the Form of the Learning Curve in Young Children," *Genet. Psychol. Monogr.*, 1933, 13. Reproduced by permission.

Figure 23 shows the results graphically, omitting merely for the sake of clearness the curves for the intermediate maze. It is seen that for the simple task the results were very much like those obtained in such experiments as those of Hilgard. After the two-months' interval the experimental (practiced) group retained very little if any of the slight advantage they had gained through training. For the complex task, however, the practiced group was not only far ahead of the control group at the end of the first test period: they also retained this superiority during the retest after a two-months' interval. Mattson says in conclusion: "Practice upon a relatively simple skill brings increased ability in that skill; however a similar amount of time devoted to rest seems to give about the same result." The author would not agree to the statement in this form, but would rather say that some skills are so simple that they are learned in a very short time, hence extended practice is not necessary. We recall that in her experiment as in the other similar ones the control subjects were also given practice, in the first and final test periods and in the retest period—but not so much.

Mattson goes on to say that the results also show that the degree of superiority of practiced over unpracticed individ-

uals increases with increasing complexity of the task. With this the author would agree. Strictly speaking, the finding holds for this situation only but it agrees with the dictates of common sense gained in observing the definite advantage of trained subjects in daily life. The author doubts if anyone contends that skill in the game of baseball or in swimming is not materially increased by practice, or that a similar amount of time devoted to rest would give about the same results!

The trouble with most of the learning experiments with children as subjects is that the tasks have commonly been so simple that very little learning was required. It is true that it is difficult to keep children well enough motivated to stick to very complex tasks of a laboratory nature until completed. But because we can't get, or haven't secured, enough data on really complex skills we should not try to generalize from the simple laboratory situations we *can* easily experiment with, to the complex and (to the child) *real* situations of everyday life.

Dr. McGraw has tried in her book on Johnny and Jimmy to deal separately with phylogenetic (instinctive or maturational) activities and with ontogenetic (individually learned) activities. Since maturation and learning are both involved in the development of any ability or skill in a growing child she naturally finds it difficult to make this separation, especially in some cases. Let us consider some of her findings about swimming.⁵ She has dealt with this as an ontogenetic activity. But she is tempted to call it phylogenetic because her study of 31 other infants showed that the normal newborn baby may not only make well coördinated swimming movements when supported in the water at the chin, but can actually be felt to propel his body through the water for a short distance. (We recall the efficient swimming of the prenatal guinea pigs in Carmichael's study.) But after a few months the infant begins to show signs of insecurity in the water. He clutches the experimenter's hand and his former reflex swimming movements are replaced by diffuse uncoördinated struggling movements. In children of two years, however, Dr. McGraw often found excellent swimming

⁵ M. McGraw, *Growth, A Study of Johnny and Jimmy*, Appleton-Century, 1935.

movements, especially when the infant was submerged for a moment or two.

Johnny was given daily special exercise in water, beginning at 231 days of age when he was past the early reflex stage. He was suspended in the water with a strap around his chest. He did not struggle but held his head out of the water while making uncoördinated kicking movements. During the daily periods no effort was made to teach him strokes. He was simply placed in a shallow tank, with strap in place, and watched, a toy being put at the end of the tank at times as a lure. As weeks went by the strap was gradually lowered, thus stimulating Johnny to new adjustments.

From the first Johnny improved gradually in coördination and also in breath control. By the time he was 308 days old — at about ten months — Johnny was thoroughly enjoying the swimming when supported by the strap, and when he was a year old (360 days) would of his own accord release his hold on the edge of the pool in order to swim its length. The later months of swimming were interfered with by transition to a different pool, and when Johnny was 18 months old swimming had to be stopped. For a month he had been swimming under water a distance of 12 to 15 feet without stopping, the experimenter raising his face so that he could take a breath. It is a pity the training could not go on.

Jimmy, the restricted twin, swam more like the other infants who were placed in water only at intervals. When, like Johnny, he was placed in the strap position at 231 days he would not hold his head above the water. At 283 days he still clutched the experimenter's hand. Whereas Johnny was swimming freely in the strap at 308 days, with good breath control, Jimmy was coughing and gagging when taken from the pool, and it was not until 597 days (about one year and eight months) that he made progress in the pool by swimming movements. He was still insecure and not nearly up to the level of Johnny at the age of about ten months.

Identical twins these were not, but this difference is too striking to attribute in any great degree to a difference in native endowment. Through continued exposure to the situation, Johnny, well-motivated and protected, had learned by his own trial and error to make many new coördinations, to execute smooth and efficient series of acts. This is learning

— and perceptual-motor learning. It proceeded on a basis of instinctive and probably some already acquired habitual or conditioned activities; but these, along with various responses not yet coördinated, came finally to be organized into a new pattern. There is no such thing as pure instinct or pure learning, and Johnny's case is a good illustration of the fact.

The efficacy of repeated opportunity for motor adjustment to new situations under good conditions is strikingly illustrated in Johnny's other accomplishments. At 21 months he scaled expertly a 70° slope (see Figure 24), while Jimmy never succeeded in climbing inclines of 24° or more. At the same age he let himself down efficiently from a stool more than five feet high, while Jimmy refused to budge from the height. In all these and other performances Johnny showed ease, poise, and relaxation of manner. In these respects he was in marked contrast to Jimmy and superior to the other children being studied. None of the 31 children could approach him in the various skills.

RÔLE OF IDEAS IN FORMING COMPLEX HABITS

Dr. McGraw's experiments demonstrate the important effect of practice under good conditions in the development of efficiency in some complex perceptual-motor activities. Although after the first few months ideational factors must have been present as the activity proceeded, there is no evidence that they were important in building the skills. In fact the remarkable progress of a ten-months' infant in such an activity as swimming suggests that Johnny's early age was an advantage, for it prevented him from being self-conscious. With the sublime ignorance and daring of infancy he went ahead as the situation and his needs dictated, not caring a bit what others thought, not thinking much himself. He merely acted, and in acting, learned.

That ideas and thinking cannot be crucial factors in the acquisition of complex motor activities is indicated by other lines of evidence. If the reader will obtain a really complex stylus maze and while blindfolded, with another person counting errors, practice trial after trial until he can run it smoothly and without errors, he is likely to have the enlightening experience of finding that he has eliminated more than

one blind alley error without ever knowing he had made it or eliminated it. This is the sort of thing that happens when a person learning to skate finds himself, as he keeps on, improving and making more economical movements, without

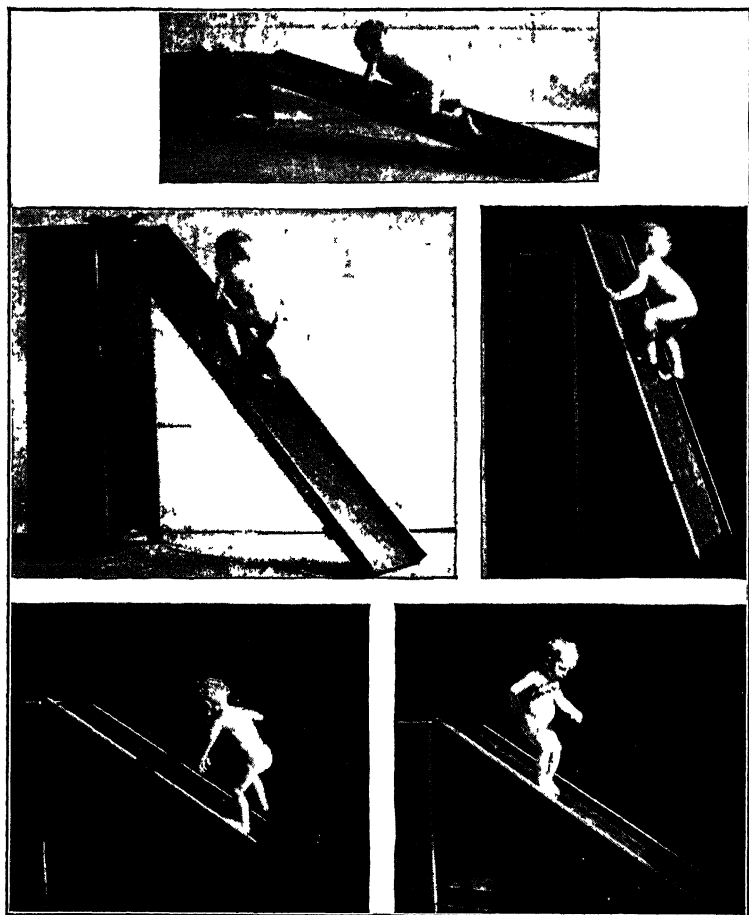


FIG. 24. BEHAVIOR ON SLIDES (JOHNNY)

Top. Johnny begins ascending a slide placed at an angle of 11 degrees when 8½ months old.

Center Left. At 10 months he ascends a slide placed at an angle of 48 degrees.

Center Right. At 21 months he scales the 70 degree slope.

Bottom. Johnny at 13 months walks up and down an incline of 32 degrees.

(Reproduced by permission of Appleton-Century)

in the least being aware of the details of what he has done.

Another line of evidence is the fact that animals very simple compared with man learn many complex serial activities as well as human beings do. An early experiment of Hicks and Carr is of especial interest in this connection.⁶ These investigators used as subjects 23 rats, five children 8 to 13 years, and four adults, requiring them to learn mazes of comparable difficulty. The human beings, blindfolded, were told simply that they were to keep moving until they found themselves in the open; while for the rats the motive consisted partly of hunger and partly of the usual tendencies to move about and "explore." Figure 25 shows elimination curves based on the results for time, errors, and distance averaged for each trial. For all the subjects, since the learning is spread out over a number of trials, learning may be said to be gradual. The rapidity of the initial descent of the curves as well as the number of trials required for learning bears no relation to the rational capacity of the three groups, a fact which indicates that *for this type of problem* the ability to use ideas is not an important factor in the learning. The initial slowness of the adults in eliminating time and errors is probably connected with more rational methods of attack which are, however, not particularly efficacious in the present situation.

A consideration of the experimental literature of animal as well as human learning reveals some fundamental similarities between the two. There are clearly certain types of situation which demand a rather complex overt type of adjustment, and human beings like the other animals are so built that they can learn to make such adjustments on a predominantly perceptual-motor basis. From the point of view of economy in adaptation, and survival in the evolutionary process, such an ability is a great advantage. Highly adaptive, very useful activity is performed by the amoeba; the fetal guinea pig swims away from a harmful stimulus without, surely, pronouncing the judgment that it is harmful; and more complex organisms, in the process of meeting a recurring prob-

⁶ V. C. Hicks and H. A. Carr, "Human Reactions in a Maze," *Jour. An. Behav.*, 1912, 2: 98-125. See also a report of children's behavior in a more simple maze situation, M. B. Batalla, "An Experimental Study of Children's Behavior in a Spatial Complex," *Ped. Sem. & J. Genet. Psychol.*, 1934, 44: 127-138.

lematic situation, may learn a suitable solution without rational analysis of the situation. But probably only the hormic psychologist would insist on seeing conscious purpose or volition in the making of the various minute adjustments neces-

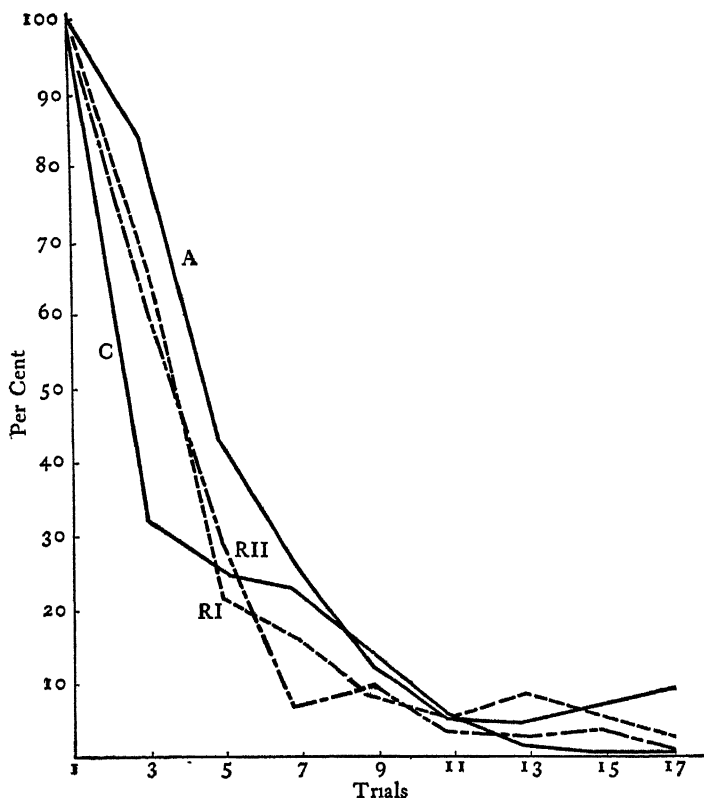


FIG. 25. PERCEPTUAL-MOTOR LEARNING CURVES OF ANIMALS, CHILDREN, AND ADULT HUMAN BEINGS

A, curve for adults; C, curve for children; RI and RII, curves for rats. These are combination curves representing in percentage terms the rate of elimination of errors, time, and unnecessary distance. From Hicks and Carr, "Human Reactions in a Maze," *Jour. Animal Behavior*, 1912, Vol.

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sary in complex motor learning. Symbolic behavior does begin to function even in infancy, as we shall show in the next chapter, and becomes increasingly important, and increasingly present in motor learning, as the child grows older.

But in infancy, in later childhood, and in adult life there are certain situations in which primarily overt behavior is demanded and in response to which highly adaptive habits can be developed without rational analysis and direction.

What can be said about the general course and rate of motor learning in children? Is it like that in animals and in adults? We should first say to the student who is not in touch with recent developments in the field that psychologists have just about given up trying to find a "typical learning curve." They find that the form of the curve varies considerably in relation to the nature of the problem, materials, and methods of learning, and also in relation to the kind of devices used in plotting the curve. It is true, however, that in a really complex process one general type of curve is found to be very common. This is an "elimination curve," usually based on the number of errors made at each successive trial, and it is usually negatively accelerated, there being a very rapid initial drop in the curve.

This is the sort of curve Hicks and Carr found for all their subjects. The writer has found, where she could motivate preschool subjects sufficiently to complete a complicated stylus maze (a difficult task) that the children's curves were of the same general form as for college students using the same maze. M. A. Wenger performed an experiment with preschool children using body-mazes of varying complexity with walls so high the children could not see over them.⁷ The time curves for the learning of the most complex maze show a rapid initial drop for all subjects and the "typical" negative acceleration. One may draw the conclusion that for a type of problem requiring complex overt adjustments for solution, children would probably, if as well motivated, learn in about the same way as rats and college students.

THE CHIEF FACTORS IN PERCEPTUAL-MOTOR LEARNING

The experiments and observations on the acquisition of complex perceptual-motor habits enable us to point out the chief factors in such learning.

⁷ M. A. Wenger, "Path-Selection Behavior of Young Children in Body Mazes," *Four. Exper. Educ.*, 1933, 2 197-233

1. *Motivating stimulus.* There would be no use in trying to get a 15-months-old child who has just had his dinner to practice eating with a spoon; and no use in expecting him to try to climb up stairs if mother and his playthings were below. A ten-year-old boy would not spend hours in practicing baseball curves, unless spurred on by recollection of past imperfections in pitching, together with hopes of future mastery. The significance of these things is contained in the statement that the presence of a *motivating* stimulus is essential to complex learning. In order to account for that persistence in a given type of activity which is necessary to the building up of a complex habit, we must suppose that there is some underlying situation which continues to arouse responses until the situation is significantly altered.

Taking food changes the hunger motive, the ability to climb stairs easily brings the child to its toys or its mother; the acquisition of a new curve in pitching brings to the boy a new sense of mastery. The motive may be a physiological condition such as hunger, or an acquired motive such as the hope of being a great pitcher. It may be simple or complex, unconscious or consciously formulated — but some motivating stimulus there must always be.

The presence of such a persistent stimulating situation explains the unitary character of the activity, and the fact that it keeps up until a particular thing happens which terminates the activity by removing the stimulus. In young infants and animals low in the scale, the existence of abstract concepts or imagined ends would be highly improbable. But the unity and "purposiveness" commonly observed in such activity as learning to creep or learning to hold the nursing bottle while feeding can be well understood as related to the presence of a powerful and dominant stimulus which must continue to call out relevant responses until such a series occurs as will put an end to the underlying stimulating situation.

A distinction is often made between the motive or the situation which is back of the organic stimulation or tension, and the incentives, or external situations to which an organism motivated in a definite way is particularly responsive. Hunger pangs furnish the motivation, food the incentive; internal sex-stimulation constitutes the motive, a member of the opposite sex, or of the same sex or some substitute, furnishes

the incentive, a high school track runner in position to start is powerfully stimulated by an organic set plus a desire to improve, while thoughts of parental approval, the silver cup, and the applauding crowds if he realizes his dream of becoming a champion, furnish the main incentives. Motives usually determine incentives, but incentives may arouse motives. Both are changed when a new adjustment is once learned, and the term motivation may well be used to include both.

Valuable experimental analyses of motivation in animals have been made,⁸ and there is some, but not much, interesting work on motives and incentives in children.⁹ In general this study has been concerned with ideational learning, where knowledge of results, social stimulation, desire to learn, and praise rather than blame, have been found to be advantageous.

2. *Problematic situation.* Intimately connected with the motivating stimulus is the second factor, the existence of a *problematic situation*. If a situation tending to arouse persistent activity in a child is soon altered or relieved by accident or by the activity of someone else, then there is no occasion for developing a new mode of activity. Hence learning does not occur unless there is some obstacle, hindrance, or weakness which prevents that relief, allows the motivating stimulus to continue, and consequently favors the formation of a new habit in the child.

The practical application of this point is evident. Parents who wish their children to acquire a large stock of useful manual habits will not only so manage things that there is strong motivation for persistent activity, but they will also refrain from removing obstacles which it is within the child's

⁸ For an excellent summary with bibliography see the chapter on "Motivation: Drives and Incentives," by C. A. Stone (In *Comparative Psychology*, Prentice-Hall, 1934, F. A. Moss, ed., 73-112).

⁹ For example see E. B. Hurlock, "The Psychology of Incentives," *Jour. Soc. Psychol.*, 1931, 2, 261-290; M. E. Keister and R. Updegraff, "A Study of Children's Reactions to Failure and an Experimental Attempt to Modify Them," *Child Develop.*, 1937, 8, 241-248. See also (1) L. Chase, *Motivation of Young Children: An Experimental Study of the Influence of Certain Types of External Incentives Upon the Performance of a Task*, Univ. Iowa Stud. in Child Welfare, 1932, 5, 119; (2) H. H. Anderson and R. S. Smith, "Motivation of Young Children: The Constancy of Certain Behavior Patterns," *Jour. Exper. Educ.*, 1933-34, 2, 138-160; (3) H. H. Anderson, "Motivation of Young Children: Further Studies in Success and Failure, Praise and Blame," *Child Develop.*, 1936,

power to overcome. Mrs. Gilbreth tells of a father who would not have safety gates at the top of the stairs, but taught the children as soon as they were able to climb to come down the stairs backward — under his watchful eye of course.¹⁰ A little boy or girl will never learn to pound nails straight unless given a hammer and nails and materials for making things, and allowed to work freely. If the nail pounding at critical points is always done by the father, the finished product may be better-looking but the child's acquisition of skill will be retarded. The child will learn effective techniques for overcoming obstacles only when those obstacles are left for him to overcome.

3. *Varied attack.* If we could suppose that the right response were the first one to appear, it is clear there would be no chance for learning. This would mean either that the correct act was instinctive or that the child had already encountered such a situation and learned the response, which is now reinstated. A *varied attack*, then, is an essential feature of genuine learning, and, other things being equal, the more varied the attack the greater the chance of success. The more movements the child makes, the more flexible the stock of habits he has acquired, the more likely he is, other things being equal, to adapt himself to a new situation, that is, the more chances there are that the right responses will be among the total number elicited. After the earliest period no learning process starts at zero, as habits already acquired may begin to function at once and so abridge the varied attack. For instance, a child learning to build a tower with blocks has already learned simple reaching and holding coördinations which give him a good start. Only in the infant's very first learning may we expect the great wealth of bodily activity which is manifested when the child begins to grasp at objects. Then, too, the varied attack is often greatly abridged because some of the movements are suggested by other people. This intelligent imitation of the activity of others enters in early, along with other forms of ideational activity, to make much of the learning of the child partly ideational in character, although the child still learns chiefly by doing.

4. *Elimination of errors.* Experiments with maze learning in adults have established the fact that *knowledge of an*

¹⁰ Lillian Gilbreth, *Living With Our Children*, Norton, 1928.

error in such sensory-motor learning is not essential to its correction, and that prevention of errors either by verbal instruction or by guiding the hand is only to a small extent effective. When too much guidance is given, or it is introduced during the final stages of learning, the number of trials required to master a problem is increased, sometimes even doubled.¹¹

Gates and Taylor devised an experiment to test the effect of "artificial" guidance of children in learning to write. One group practiced five minutes a day for 19 days at tracing given letters on transparent paper. Another group practiced copying the same letters on another sheet without guidance, five minutes a day for 14 days. In the middle and end of the training, copying tests were given. While the number of false moves during learning was very much less for the tracing group, their improvement in learning to write was slight. Although they spent even less time in practicing, the group with no guidance had made marked progress.¹² The experiment indicates that for children as well as for adults a certain amount of error is essential to the perfection of an act of skill. Conclusions from experiments are corroborated by everyday observations of children, so that we may regard it as established that the elimination of errors is a necessary part of the learning process. A child is not likely to form effective motor habits of a given type if the parent or instructor is constantly interfering to prevent errors, to guide and to "help."

5. *Fixation.* A final factor in the process of perceptual-motor learning is the *fixation* of correct responses with the practice of the whole new activity until it functions smoothly. This fixation, occurring simultaneously with the elimination of errors has been explained in various ways by psychologists. We may deal briefly with some of the leading theories.

SOME PRINCIPLES OF EXPLANATION

1. *The doctrine of frequency.* According to this explanation it is the successful acts in the process of learning which

¹¹ H. A. Carr, "Teaching and Learning," *Ped Sem. & J. Genet. Psychol.*, 1930, 37: 189-219

¹² A. I. Gates and G. Taylor, "Acquisition of Motor Control in Writing by Preschool Children," *Teachers College Record*, 1923, 24: 459-469

are in the nature of the case most often repeated, and mere repetition strengthens an act and promotes its retention. But such an explanation can be at best no more than partial, for we have to explain why it is that unsuccessful acts, though frequently performed, are soon eliminated. As Carr has demonstrated, the elimination of errors is an essential factor in the learning process; and this means that mere repetition of the correct movements, however long-continued, will not result in learning. Kantrow could not establish conditioned sucking responses unless her subjects were motivated by hunger. Many other experiments have shown that merely going through the motions of an act does not fixate the act; the fixation is the result of the operation of various factors in a complex learning situation.¹³ And the reason why "practice makes perfect" is that as the successive practice periods occur they provide opportunity for the operation of these other factors. Repetition of the correct movements only would probably never result in learning; repetition of *the whole learning situation* (practice) is essential. If the habit is simple, or if the subject has good "learning ability" or is very highly motivated, little repetition of the situation may be required. (If it is ideational, one experience may be enough.)

Practical applications of these findings about frequency are not commonly made in current books on child care. The author suggests that thumb-sucking can not be cured by "gently removing the child's thumb from his mouth every time he puts it in." The collapse of the doctrine of frequency removes the last reason for following that procedure. Nor can enuresis be cured merely by taking the child up regularly so that he does not wet the bed. It has been found that mechanical devices to prevent masturbation are not effective in curing the habit. The aim in all such cases should be, according to our theory, to deal with the whole situation, not merely the specific acts it is desired to control.

It follows also from what we have said that the strength of a habit is not necessarily related to the length of time during which it has been practiced. Sometimes a long-standing

¹³ For a general analysis of learning see chaps 14 and 15 in Dashiell, *Fundamentals of General Psychology*. Knight Dunlap, in his book *Habits, Their Making and Un-making*, chap. 10, discusses newer findings about frequency

habit simply drops out of the total behavior picture because the motive which gave rise to it no longer exists.

2. *The pleasure-pain theory.* Thorndike, in a monograph published in 1898, attributed the elimination of an act to the pain or displeasure aroused by it.¹⁴ Now it is difficult to understand how a subjective *state of mind*, following an act, could have a retroactive effect and cause the act to be omitted next time, but it is easy to see how a sensory stimulus resulting from an act may be followed by a withdrawing movement, and how later an associated stimulus could condition this movement. Besides the theoretical objection, experimental evidence makes the theory of the selective value of pain (or pleasure) untenable. In human adults who can make introspective reports it has been proved that blind alley or other errors are sometimes eliminated without even a *knowledge of their existence* on the subject's part, not to speak of definite displeasure.

But even when pain or pleasure is present, it is not to be regarded as a casual entity apart from the act, which in any sense *causes* the act. Rather are pain and pleasure the subjective aspects of a strongly negative or strongly positive response. The act is a unit. The child does not withdraw from a hot iron *after* and as a result of the pain-sensation, but the withdrawing is immediate and of the reflex type, and *while* he touches and withdraws, he feels pain. In general, positive responses are pleasantly toned, negative responses unpleasantly toned. The now pretty generally discredited pleasure-pain theory is thus seen to be only descriptive (of some cases) and not explanatory.

3. *The theory of sensory consequences.* S. J. Holmes and H. A. Carr independently suggested this principle, named by Carr, according to which a movement tends to be eliminated when its sensory consequences are such as always to lead automatically to its discontinuance. The rat reaches the end of a blind alley and *each time* withdraws. Why? Because he has learned to make a turning movement when confronted by a blank wall. The child reaches for the candle flame and before he grasps it withdraws his hand. Why? Because the

¹⁴ E. L. Thorndike, "Animal Intelligence, An Experimental Study of the Associative Processes in Animals," *Psychol. Rev. Monogr.*, Supp. 11, 1898, No. 4, 1-109.

heat of the flame is a stimulus for this reflex movement. In each case we see that as a result of the movement the animal is stimulated in such a way that another movement occurs.

Now we have here just the circumstances that usually result in conditioning. The baby is stimulated by the sight of the flame, then the cutaneous (pain) stimulation resulting in a withdrawing movement. After this the withdrawing movement or other "non-approaching response" is evoked by the originally inadequate visual stimulus. The rat is stimulated by a certain kinæsthetic cutaneous or visual situation as he approaches the end of the alley, then by the visual or other stimuli at the end, following which he always turns. With repetition we should expect in each case that the first stimulus would evoke an avoidance movement in substitution for the originally adequate stimulus encountered when the first movement is made.

Thus one factor in the elimination of errors is conditioning. Another is orientation, or a tendency to continue in the general direction of the goal rather than in another direction. These and still other perceptual-motor factors have been shown by experiments to be involved in maze learning in rats. Such objective types of explanation make intelligible the learning of complex habits by animals low in the scale and by very young children. They presuppose no complex conscious choice or ideational activity such as would be highly improbable in a white rat or a four-months-old baby (unless we accept a theory of innate ideas or a rational soul). They avoid theoretical difficulties inherent in dualistic explanations such as that long ago advanced by Thorndike, and for years abandoned, even by its originator.

SPECIAL PROBLEMS OF LEARNING

1. *The relation of age to learning ability.* Is the popular theory justified that young children have greater ability than older children and adults to acquire complex overt habits such as skating and dancing? This problem has not received adequate experimental investigation, but some work has been done. For example, Freeland selected one child from each grade between the first and sixth and had them practice ten minutes a day for the school year at learning to type by the

touch system. He found that for each of the six there was rapid learning at first and then a long irregular plateau with slow progress. There were more fluctuations in the curves for the younger children. The oldest learned most readily and retained best. M. C. Langhorne trained 78 children aged seven to seventeen years on the "pursuitmeter," an apparatus in which the subject is required to keep a stylus in contact with a moving lever with as few breaks in the circuit as possible. In this experiment the limits of improvement and the rate of improvement were found to increase, in general, directly with age. The best performance was reached at adolescence.¹⁵

Slight as is the evidence we have, it is enough to make us doubt the traditional assumption that children are much superior to adults in the ability to master motor habits such as skating, dancing, and the like. Carr has suggested that the difficulty actually experienced by adults in acquiring such accomplishments may be due not to a deterioration of ability but to lack of interest or to embarrassment, and consequent failure to enter wholeheartedly into the task. F. N. Freeman points out that the adult is sometimes helped by habits previously acquired but sometimes, also, is handicapped by the possession of long-standing habits of sensory-motor adjustment which may conflict with the features of the new activity it is desired to attain.

Freeman's point finds particular illustration in the case of speech habits. An adult may be inferior to a child in learning a foreign language because he has more difficulty in inhibiting habits of pronunciation of many years standing. We may conclude that while the younger adult probably has the ability to learn more readily than the child, the latter has an advantage over him in interest and enthusiasm, and in relative freedom from conflicting previous habits and emotional inhibitions. Hence while no adult need despair of his ability to acquire a new perceptual-motor habit, parents who wish their children to be able when they grow up to enjoy a variety of outdoor sports, and to be skillful in common manual tasks,

¹⁵ G. E. Freeland, "A Year's Study of the Daily Learning of Six Children," *Ped. Sem. & J. Genet. Psychol.*, 1921, 28: 97-115; M. C. Langhorne, "Age and Sex Differences in the Acquisition of One Type of Skilled Movement," *Jour. Exper. Educ.*, 1933, 2: 101-108.

will certainly be wise in seeing to it that they learn these things while still children.

CONCLUSIONS ABOUT PERCEPTUAL-MOTOR LEARNING

Our knowledge of the essential features of conditioning and complex perceptual-motor learning in animals, including children, is sufficiently advanced even at the present stage of research to justify important application to the training of children. Some of the directions which such application should take may here be very briefly indicated.

In the first place, it seems clear that the habits basic in civilized life should be ingrained, mechanized, made second nature, as it were, as soon as possible. This will involve the early establishment of regular habits of feeding, sleep, and elimination, habits which function on a primitive conditioned-response level; of socially-approved ways of walking and communication by gesture or speech; of "good table manners," and the like; and finally of general habits of neatness, cleanliness, and promptness. Such habits the child will in ordinary circumstances never need to change, but he will need to utilize them every day of his life. The more they are practiced the longer and better they will function; and when they become second nature the child will be left with desirable freedom for other more interesting activities. But if undesirable habits are allowed to get a start, it will be very hard to break them, and they may in certain cases remain to handicap the person for the rest of his life.

On the other hand, great care should be taken not to fixate too firmly habits that may have to be changed. A child may, for example, become so accustomed to the comfortable routine of a luxurious home that he cannot adapt himself well in a summer camp in the woods, or may be utterly miserable if, because of a change of fortune, he has to live in a "one-bathroom house." Certain "ways of living" must be kept flexible, through the avoidance of too rigid a routine, through practice of their components in a variety of situations.

A third important deduction from the treatment of learning given in this chapter is that parents should, when their circumstances permit, provide favorable conditions for the

early learning of the particular motor skills which they consider important. Thus various forms of outdoor sport, and such activities as singing and dancing, may be most naturally and effectively acquired before self-conscious adolescent years. This is not because after that age children are incapable of learning so well, but simply because they are likely to lack the time or the incentive, or to feel so awkward or so ashamed that they will not throw themselves into the process with the spontaneity which is necessary to an effectively varied attack.

Finally, the psychologist may call attention to the great importance for effective learning of seeing that certain desirable conditions exist — a strong motivating stimulus, the presence of an obstacle or problem, freedom to make mistakes, and practice under varying circumstances. These factors have been found to be essential to genuine learning, to the acquisition of habits which last and which can be utilized in later situations.

SUGGESTIONS FOR READING

Lovisa Wagoner's excellent book, *The Development of Learning in Young Children* (McGraw-Hill 1933) discusses motor as well as other types of learning. . . . Joseph Peterson's "Learning in Children," chapter 10 in the *Handbook of Child Psychology*, summarizes and interprets the experimental literature. . . . Students are again referred to Dr. McGraw's account of the remarkable motor accomplishments of Johnny as well as to the Kelloggs' account of the achievements of the young ape. . . . Josephine C. Foster's *Busy Childhood* offers helpful suggestions to parents.

CHAPTER X

THE ORIGINS OF MEANING: THE FIRST IDEAS AND THE DEVELOPMENT OF SPEECH

A BABY of one month responds only to a very limited range of stimuli. Things happening in the next room are entirely beyond his ken, the past is probably non-existent in his thought, the future unimagined. He has no ideas of self or of other people, no conceptions of the world, of space or time or beauty. Taken to the top of a high hill in the midst of a fertile countryside, he would see nothing of the fields and villages, or the green hills against the sky. The sound of the engines in the city below, the whirring of an airplane, the rush of the wind in the pine trees—none of these would have for him either value or meaning.

Yet in five years more, taken to the same hilltop, this child will look out seemingly upon the same world, exclaiming about things far and near, asking questions, scanning the sky when he hears an airplane, and breathing in the odor of the pine trees with delight. Years later, as a youth, he will see a still different picture. He may then be less interested in the objects themselves than in what they stand for. Not factories in the hill villages, but problems of modern industry may occupy his mind, not the number and size of the houses, but the lives and thoughts of the people living in them. The sight of the hills against the sky may make him feel dissatisfied with his own city home and way of living; he may begin to dream and to plan out his own future.

Obviously, the same world appears very differently to different people. But for every child its meaning grows and changes with astonishing rapidity. How does the world come to take on this rich and changing significance? It would be too much to expect, ever, an entirely adequate explanation of this complex and marvelous development. The psychologist can, however, show that it is an orderly process and point out some of the factors and principles involved.

Since it is chiefly through the language used by the child

that we can gauge his increasing power to identify and interpret things in his world, we must first consider the origins of meaning. This will be the subject of the present chapter. In the two following chapters we shall deal with the further elaboration of meanings, one chapter being devoted to a discussion of the main types of meaning and their development, the other to a consideration of the organization of meanings in thinking and reasoning. Only after such a genetic treatment shall we be in a position to summarize the ways in which the child's world takes on meaning, and to point out how adults may help in making that meaning rich and adequate.

THE ORIGIN AND DEVELOPMENT OF LANGUAGE

Pre-verbal Non-symbolic Control.—Very early in infant life particular objects and situations come to call out special responses which serve as signs to adults and which, as means of communication and control, represent a primitive sort of language. Such responses may be called gestures. At first a baby who has just learned to reach for objects may, when hungry, reach as eagerly for a talcum powder can held out before him as for his nursing bottle. Soon he will respond thus only to the bottle. The baby learns gradually to respond differentially to the various objects and persons in his immediate environment. Each, through repeated conditionings and formation of definite habits, comes to call out a specific set of responses. Thus are objects "defined" and effective adaptive responses to them made possible.

Partial or beginning responses are soon observed to occur before the whole object is encountered. A three-months-old child may reach out his hands when he sees his rattle in front of him. A nine-months-old baby begins to smile and rock excitedly in his basket upon hearing his mother's voice outside. A three-year-old boy may shrink, scowl, and cry at the approach of a big dog.

In such early patterns of response we may see the beginnings of the type of intelligent behavior (perception) which later on becomes important in problematic situations, as serving to characterize and define the situation preparatory

to effective adjustment. These overt responses are essentially preliminary reactions involving adaptation at a distance. As such they make possible a certain measure of "control" by adults or, later, by the child.¹ A hungry baby may be kept from crying until his bottle is ready by continued talk from his mother. A timid little boy may escape the frightening presence of a dog before he is subjected to closer stimulation.

To the little child, of course, this "control" is at first unplanned and unforeseen. The act of withdrawing simply occurs as a conditioned response to the sight of a dog, based on previous experiences with the animal when loudly barking. Overt movements, which the baby learns to make in response to certain classes of objects, thus soon take on significance as signs to adults. A baby who has had enough milk turns his mouth away from the nipple. Later this sidewise turning, it is observed, occurs before the nipple touches the lips. Such conditioning affords the basis for the development of gestures. In this case the shaking of the head, associated with a refusal to take, soon means "no" to adults, and they act accordingly. Similarly, the reaching up of the hands with smiling may mean "take" and the reaching out of one hand may mean to the adult "give me."

Vocalizations also become important as signs. Certain cries, the adult soon learns, are associated with pain stimulation. Others are anger responses; as, for example, when the baby's movements are hampered because his sleeves have been pinned down to prevent thumb sucking. Similarly, peculiar little "shouts of joy" may begin to occur when the baby's position is changed and he is allowed to kick, or when he is put in the bath. The statement is often made that such cries, when found to be effective, are used as a means of communication and control. They do certainly perform this function, but in so far as the statement implies that the baby consciously or deliberately utilizes those cries as means to an end, we must take issue with it.

Let us take, for instance, the case of the baby said to be crying "because he wants to be picked up." A young baby, not stimulated in any way by hunger, pain, pressure of gas, muscular strain from lying in one position, or by extremes

¹ Floyd H. Allport, *Social Psychology*, Houghton Mifflin, 1924, chapter 7.

of temperature, begins to cry while lying in his crib. The nurse picks him up and pats him. He stops crying and responds appropriately to the cuddling, but when put down he is likely to cry again, this time for an added reason. The original crying was probably a mere random reflex response to intraorganic stimuli; but now we may have also interference with an ongoing activity, an interference involving such sensory changes as are observed often to elicit responses of crying or anger. For example, if the baby's finished bottle is suddenly taken away from him, he may cry although he is no longer hungry, as proved by subsequent behavior. Taking him up again will thus only aggravate the situation.

If in the first place the baby is not taken up, the random crying soon gives way to other movements, perhaps of the hands or feet; or the baby may go to sleep. If never taken up unless for due cause the baby will establish in connection with the *usual* "lying-down in crib situation" only the ordinary response of playing and sleeping or, perhaps, occasional mild crying. In other words, he will not "want to be picked up," unless stimulated by pain, cold, and the like. But if often picked up when these harmful stimuli are not affecting him, the response of crying when lying in the crib will be likely often to occur when other stimuli (such as intraorganic stimuli inducing sleep) are not more compelling. Thus a vicious circle may be established, and adults may become slaves to the "desires" of a baby who is only responding reflexly to conditions which they themselves have set up. Not until much later does the child become sophisticated enough consciously to use crying as a means of control.

Simple movements, then, including cries or vocalizations, early become significant in making possible communication with and "control" of adults. As gestures, they may be said to represent the first stage in the development of language, although to the infant himself they have at first no symbolic meaning.

Even before the end of the first nine months, however, there are indications that some of these movements or gestures *are* beginning to mean something to the child himself. In describing the growth of Ann in chapter two we pointed out how strongly certain ways of acting on her part suggested that she was really thinking. All young children long be-

fore learning to speak are observed to act in ways which very strongly suggest that they have ideas of things not present. For example, the Scupins report this behavior on the part of their one-year-old son, who had taken a favorite celluloid goldfish out with him for his airing. "We noticed that the child all at once became restless; he moved uneasily back and forth, and at last turned right around and kept staring over the back of his carriage onto the sidewalk. Then he uttered impatient cries and looked at us with entreaty. It turned out that the goldfish was missing, and the nurse-maid found it lying on the walk a hundred steps back. The child had thrown it down but wanted it again, and was crying to call our attention to his loss."²

Suggestive and convincing as such observations are, we cannot be sure, in the absence of experimental control, that essential factors are not overlooked, and that the behavior could not be interpreted as response to present stimulation. If such behavior has developed through perceptual-motor processes only it can not be called ideational. Before considering this evidence, it is desirable to ask what we mean by a thought or idea. Following provisionally the analysis given by Hunter in "The Delayed Reaction" we may say that an idea is a representative process standing for some absent object or situation; or with Carr that an idea is "some present process or item of experience considered in its symbolic representative capacity."³

Evidence for Pre-verbal Symbolic Behavior or Thinking.—There are possible two crucial tests of the theory that ideas precede speech. If animals (which certainly do not use speech) can be shown to react not to a present sensory situation but to some symbol standing for that situation, and if human babies before they learn to speak can be shown to behave similarly, then the case is settled. We shall show that there is excellent experimental evidence verifying both these hypotheses.

1. *Experiments on ideas in animals.* Much experimental work on animals strongly suggests that in certain situations

² Ernst and Gertrud Scupin, *Bubi im ersten bis dritten Lebensjahre*, Grieben, 1907, p. 52

³ W. S. Hunter, "The Delayed Reaction in Animals and Children," *Behavior Monogr.*, 1912, No. 6, H. A. Carr, *Psychology*, Longmans, 1925, p. 169

many of the higher mammals are able to utilize symbolic cues, but the best controlled work is probably that using the now very well-known method of the delayed reaction. We shall describe the method and the results of the pioneer experiment of Hunter, which was a model of careful planning and systematic experimental control.⁴ In this experiment, conditions were so arranged that the animals could get food only by going to one of three boxes in which a light appeared. After they had learned always to go to the lighted box, they were restrained at each trial for a varying period after the light was turned off, and thus could go to the right box only if they retained some clue to its position during the delay. Hunter found that the rats, cats, and dogs could go to the right box after delay only if they maintained a definite bodily orientation during the interval. A dog, for example, might, after the light in the box went off, remain lying during the delay with its nose pointed toward the box, and when released would follow his nose. This type of response is clearly a reaction to a present postural (kinæsthetic) stimulus.

The raccoons, however, in a significant percentage of trials reacted correctly after delay *even when they did not maintain any type of bodily orientation*. Assuming that all other external sensory clues were excluded, as we may, considering the excellent experimental control employed, the conclusion is plain that the animals must have utilized some implicit (intraorganic) cue, which stood for or symbolized the lighted box. In other words, they used "ideas." A particular implicit response originally made to the lighted box must have been reinstated after delay when the animal was again in position facing the boxes, and this symbolic response must have furnished the stimulus to the correct movement. If in this way the positional stimulus involved in again facing the boxes elicited this intraorganic response we must assume that the inner response was fixated at the time of exposure to the light, and that the neuro-muscular conditions necessary for its retention during delay existed as for any other learned response. Notice that nothing need be assumed as to the precise nature of this hypothetical ideational response. It might be muscular, glandular, or even

⁴ W. S. Hunter, *op cit*

purely intraneural, simple or complex, conscious or unconscious, accompanied or not accompanied by some sensory image of the lighted box.

2. *Some experiments on ideas in children.* In the same delayed reaction experiment with a modified type of apparatus, Hunter found that all of the five children tested reacted correctly in a significant percentage of trials, the percentage of correct responses rising with age. Since the youngest child was two and one-half years old, we could explain its behavior as due to the use of either overt or implicit speech. This explanation would not hold for animals, but it might be maintained that experiments on animals are inconclusive. Hunter's are by far the best controlled of those performed, but of course his is only one experiment, and there is a possibility that some source of error was overlooked.

A further experiment by Hunter on "The Delayed Reaction in a Child"⁵ is therefore of particular interest, since his subject, a little girl 13 to 16 months of age had no *vocal language*. The approximately half-dozen words she used occurred only in response to definite sensory stimuli, and experimentation was stopped after three months, before the first signs of symbolic language appeared. This child, Hunter's daughter Thayer, was seated before an apparatus similar to that used for the animals in the preceding experiment. (Cf. illustration, Fig. 26.) A favorite toy was placed in her hand and as she was responding to it with interest Hunter took it from her and placed it in one of the boxes. After she had leaned over or been pushed over and had looked in, the lid was closed, and the baby was thoroughly distracted by carefully planned "play" during the interval of delay. About two seconds before the end of the delay period Thayer's body was straightened around and she sat facing the apparatus. In all but a few cases in 284 trials, she began to hunt for the stimulus as soon as she was in position.

The results of this experiment seem conclusive. From the first Thayer reacted correctly after a delay of as long as at least ten seconds, and by the end of the experimenting had mastered the 24-second interval. It is possible that these successes were due to cues unconsciously given the child

⁵ W. S. Hunter, "The Delayed Reaction in a Child," *Psychol. Rev.*, 1917, 24: 74-87.



FIG. 26. NANCY ALICE CHOOSES THE LEFT BOX

This apparatus is essentially like Hunter's.

by Hunter, since he held her at the moment of release. If that were the case, however, it would be hard to understand why there were so many errors, and why the subject was unable to delay longer than a definite number of seconds. On the whole, the conclusion seems justified that the child was reacting on the basis of the retention of a "memory-idea" of the position of the box.

Miss Jeannette McClure, working under the author's direction with both a two-box and a three-box apparatus, has obtained similar positive results from several infants. Allen obtained positive results from a large number of year-old infants.⁶

Since not only careful observation but convincing experiments indicate the use of ideas by some animals and by children too undeveloped mentally to use words symbolically, it is clear that *ideas precede speech*. The "present process or item of experience" which stands for the absent object may reasonably be thought of as a definite response of some kind, a response either of a striped or smooth muscle or of a gland. It might even be a purely neural process, although there are good reasons for objecting to such an

⁶ Jeannette McClure, *A Critical Survey of Measures of Intelligence in Preschool Children*, unpublished Master's thesis in the library of Smith College; C. N. Allen, "Individual Differences in Delayed Reaction of Infants," *Arch. Psychol.*, 1931, no. 127.

assumption. In adults the response is very likely to be sub-vocal, that is, a response in some of the internal laryngeal muscles which was originally a part of the spoken verbal response, but is not now complete enough to produce a sound. In little children who do not talk, and in animals when they utilize ideas, the symbolic response must be non-verbal. It might consist of an overt or an inner "gesture," of a motor set or bodily attitude, of some change in glandular secretion, of a visceral "stress" or a kinæsthetic "strain" somewhere in the organism.⁷

In the delayed reaction in the infant, we must suppose that at the time of first seeing the toy placed in one of the boxes some definite response of one of these types was made, a response associated at that time with incipient reaching movements toward the box, and visual as well as bodily orientation toward it. The response is thus associated with the general situation in much the same way that a new word may be in an older child. Just as a new word may be learned on one occasion, so may this non-verbal symbolic response be fixated while the toy is being put in the box. And just as the new word may be retained and recur in a similar situation later, so may this hypothetical response "X" recur later on. Although during the delay the response is not functioning, when the child is again in position and free from distraction the newly learned response will tend to recur. And when it does, it tends to elicit the bodily turning and the reaching movements with which it became associated just before the delay. Thus the correct box may be chosen.

Although speech and written language are not essential to ideational behavior, they are certainly in human beings the most important instruments of thought. We shall therefore consider in some detail the origin and development of speech and the probable process by which it assumes symbolic significance.

Stages in the Development of Speech.—Floyd H. Allport suggested an analysis of speech development⁸ which

⁷ For a clear treatment of some of the possibilities in the way of symbolic responses in thought see H. L. Hollingworth, *Psychology — Its Facts and Principles*, Appleton, 1928, 309-313.

⁸ F. H. Allport, *op. cit.*

has been a model for later treatments. We shall discuss the chief stages as listed by him.

1. *Random articulation.* During the first half-year we may observe in infants the spontaneous making of simple sounds, first almost purely vowel sounds, such as *ă* and *ã* sometimes aspirated (*hă* or *ah*) or nasalized (*an*); later, especially after the third month, various vowel-consonant combinations, as *mă*, *gă*, *ăng*, and finally vowels with labials and fricatives, making such sounds as *pŭp*, *ŭv*, and the like. These sounds apparently occur in an order determined roughly by growth of the finer laryngeal and other muscles. They improve in smoothness and facility through growth and practice. A part of the general random reflex activity of the infant, they are called out by intraorganic stimuli, and are connected with a general state of bodily well-being and organic tonicity. These speech sounds are to be contrasted with the sharper cries or noises which are definitely emotional in character.

These random infantile articulations are now being carefully studied. L. M. Malmberg, working under Gesell's direction, observed and recorded as well as he could the total vocal output of a six-months-old baby for 24 hours. The accompanying diagram (Figure 27) shows the character of the vocalization. Out of such material are the words of adult speech gradually fashioned.

2. *The babbling stage, with the fixation of circular responses.* "The chief significance of the vocal play of babies," says Allport, "seems to be in establishing circular reflexes between the sound of the syllable and the response of speaking it." When the baby articulates a given syllable, for example "da," he is being stimulated by two main groups of stimuli, one the auditory group represented by "da," the other a kinæsthetic-tactual group arising from the responses of the laryngeal, throat, and tongue movements which occur as the word is said. Now with a few chance repetitions of the sound, we have the essentials for the formation of a conditioned response, namely two stimuli affecting the organism at the same time and followed by a common response, the speaking of another "da." On the basis of our knowledge of facts about conditioned responses, we should expect the sound of "da" alone finally to become an adequate stimulus

for the response, and hence should expect that later when another person says "da," the child would tend to repeat it. The playful repetition of sounds, "da, da, da," "ma, ma, ma," "ji, ji, ji," and the like, is a characteristic feature of the infant's vocal activity, especially in the last part of the first year. Thus during that year he not only acquires a great deal of practice, through random articulation, in the

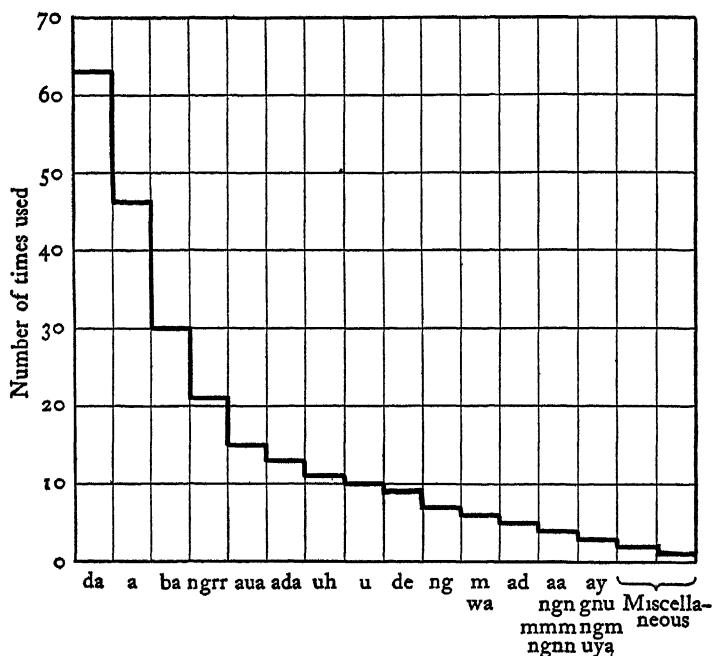


FIG. 27. VOCALIZATIONS OF A SIX-MONTH-OLD CHILD DURING TWENTY-FOUR HOURS

Sixty-four different sounds were distinguished. From Gesell, *Mental Growth of the Preschool Child*. Reproduced by permission.

chief elements of his future speech; but he also by his babbling establishes the conditions which make it possible for him later to imitate the speech of others.

3. *Evoking of the articulate elements by the speech of others.* The infant having been so conditioned by his spontaneous "practice" that the auditory stimulus of a sound alone is sufficient to produce the response of making the

sound, the next step is clear — that is the evoking of the sound by the auditory stimulus *given by others*. Here we have an ordinary conditioned response, and when a child says “da” after an adult, he is showing the effect of specific learning or conditioning. By repeating to the child other sounds which he has already spontaneously practiced, adults may evoke the sounds again and again and thus lead to facility in their use. No sound, however, will be thus repeated which the child has not already used. This consideration explains the great difficulty parents report in getting their children to imitate particular sounds. If there were an innate “instinct” to imitate, such lack of success would be hard to understand, but on the basis of the present theory it is easily explained.

4. *Conditioning of the articulations by objects and situations.* Let us suppose that on the evening of the day on which the mother has first got the baby to say “da” and “da-da-da” after her, the father comes into the nursery. The baby smiles and begins to move his arms up and down while looking at his father, while the mother says “da-da.” The baby repeats it. This is the beginning of frequent practice in which the sight of the father, the sound of his voice, or the whole complex stimulating situation with its positive emotional motivation, is connected with the response “da,” or a variant. Practice of the two-syllable form “da-da” is encouraged by adults, while that of the one-syllable form is regularly interfered with. After some time the baby says “da-da” as soon as he sees his father.

Thus the first naming habits originate. At first they are uncertain and “mistakes” are very common. “Da” may chance to become associated with the bottle rather than the father, and the usage may persist for a long time, especially if it is encouraged by adults. Or “da-da” may be a name given to all persons or to all men, or to all dark men with beards, according to the nature of the practice and the amount of detail in the stimulus-pattern to which the baby has learned to react. Again, a chance utterance of the child may be connected with any familiar object, and, if its use is encouraged by adults, become the name of that object. For example, the writer’s little nephew one day kept repeating “du du” as if in entreaty. When his mother gave the thirsty

child a drink he was satisfied, and she, concluding that by "du" he "meant" water, always called water "du" after that, and so the word was for a long time a part of his vocabulary.

In a similar way random articulations may become attached to situations, such as a man coming or a dog barking; and thus verbs are acquired. It must not be supposed that in the early development of speech all words are acquired separately and then combined in sentences. On the contrary we find commonly that whole sentences are learned at once in connection with a complex situation; and the differentiation of this "sentence-word" into words referring to parts or aspects of the situation comes only after much experience. Conversely we have the "word-sentence." For example, the word "Bread" may mean "Give me some bread" or "I want bread." Hence there is a question as to the value of attempting to classify the words used by young children as parts of speech.⁹

According to the foregoing analysis, adults should not expect children instinctively to imitate their speech. They must wait until a sound similar to a common English sound or word occurs in the infant's "talk" and then take advantage of this to encourage practice. At best the first words will be crude approximations to adult speech, but once the most common elementary English (or French or Chinese) syllables are acquired, progress will be rapid.

Development of Vocabulary.—The existence of a large number of excellent vocabulary studies makes it possible to gauge objectively the rapidity of growth in vocabulary from year to year as well as to estimate the importance for growth in vocabulary of such factors as intelligence, sex and social status.

Records of the growth in vocabulary of individual children have been common since the very beginning of the child study movement. Among well-known early studies are those

⁹ A. Gesell, *Mental Growth of the Preschool Child*, Macmillan, 1926, 213, 216, 217. Analyses and examples are given in W. Stern's *Psychology of Early Childhood*, Holt, 1924, chap. 10. See also D. McCarthy, *Language Development of the Preschool Child*, Univ. of Minn. Press, 1930; M. S. Fisher, *Language Patterns of Preschool Children*, Child Develop. Monogr. No. 15, Teachers College, Columbia Univ., 1934; E. A. Davis, *The Development of Linguistic Skill in Twins, Singletons with Siblings, and Only Children from Age Five to Ten Years*, Univ. of Minn. Press, 1937.

of Preyer, Moore, Shinn, and Major. Among later reports of vocabularies at different ages are those by Bateman, Brandenburg, Pelsma, Mr. and Mrs. G. M. Whipple, and the important German studies by Clara and William Stern.¹⁰ In making these studies various methods were used. In general, continuous records of words used were made only for years under three. Vocabulary at later ages was estimated by counting all words used during a given time, for instance during one day, or by giving vocabulary tests. Some counted all grammatical variants while others did not, and in other respects, also, the standards and methods varied.

In recent years standard vocabulary tests have been worked out and applied to groups of children. In France Alice Descoedres has devised elaborate "Tests of Language" by which may be obtained fairly accurately a child's vocabulary at various ages. Her tests have proved significant also as intelligence tests. In this country vocabulary tests have been developed by Kirkpatrick, Starch, Terman, and others.

The most important experimental investigation of the vocabulary of groups of children so far published is that of Madorah E. Smith, made at the University of Iowa and published in 1925.¹¹ Miss Smith constructed a list of 203 words in common use by young children, using as a basis every twentieth word in a list from Thorndike's *The Teacher's Word Book*. Then by tests and questions she determined the number of words known, and computed a child's total vocabulary by multiplying the number known by 20. Many objects and pictures were used to elicit use of the test words, and where these could not be used, standard questions were employed. This method of testing vocabulary was proved to have a high degree of reliability, by comparison with 77 published actual vocabularies, by checking with mothers' observations in three cases, and by correlating with

¹⁰ J. F. Markey, *The Symbolic Process* (Harcourt Brace, 1928) and M. M. Lewis, *Infant Speech. A Study of the Beginnings of Language* (Harcourt Brace, 1936), both report studies of vocabularies and give theoretical discussions. See also various recent articles in periodicals reporting on particular children. (See *Psychological Abstracts* for references)

¹¹ Madorah E. Smith, "An Investigation of the Development of the Sentence and the Extent of Vocabulary in Young Children," *Univ. of Iowa Stud. in Child Welfare*, 1926, 3, No. 5.

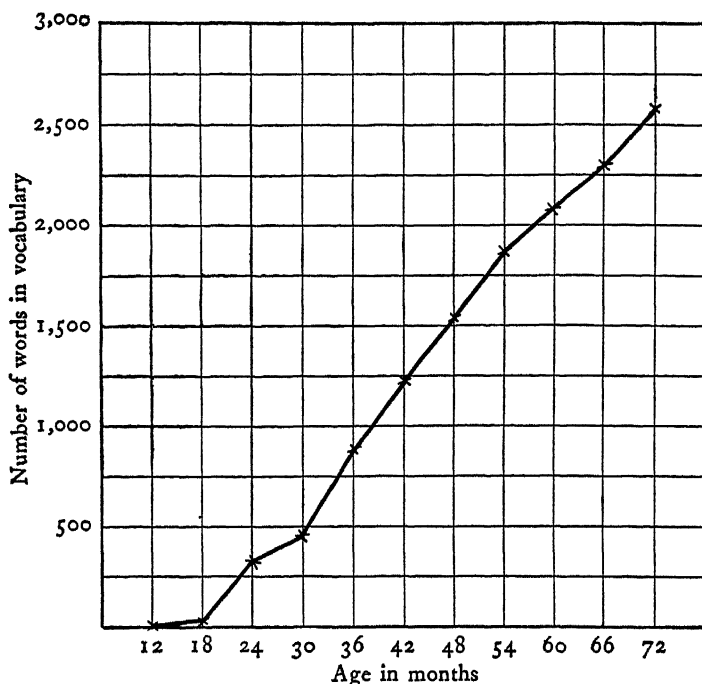


FIG. 28. AVERAGE SIZE OF VOCABULARIES OF CHILDREN FROM ONE TO SIX YEARS

The curve is based on records from two hundred and seventy-three children, forty-three children being tested more than once. From "An Investigation of the Extent of Vocabulary in Young Children," by Madorah E. Smith, *Univ. of Iowa Stud. in Child Welfare*, Vol. III, No. 5, 1926. Reproduced by permission.

the Descoeudres tests and Cobb's rearrangements of the Terman vocabulary test in the Binet scale.

Smith applied her test to 273 children of Iowa City, taking at least 13 children for each half-year group from eight months to five and one-half years, and nine children six years of age. The results, plotted in Figure 28, show an extremely rapid but steady increase in vocabulary up to six years. After the age of six the rate of acquisition of words is not so rapid, since the child, now having a fair working vocabulary, has not the same motive for acquiring new words.

Smith's results were not in accord with those of some other

investigators, Descoeudres for example, in suggesting that social status is not an important factor in influencing size of vocabulary. When 22 pairs of children of the same mental and chronological ages from the University School and Day School groups were compared, no valid differences in vocabulary were found. The university group, representing a higher social status, might have been expected greatly to excel the other group. Descoeudres, not eliminating differences of intelligence, had found great superiority in vocabulary among children of higher social status. It seems probable that Smith's two groups did not differ markedly in social status, or else the children were not representative of their respective "social classes." For H. M. Williams and Mary L. McFarland, in the course of making a thorough revision of the Smith test,¹² matched 31 orphanage children in mental age and I.Q. with 31 children in the original Smith study, and found that for children at every mental age the vocabulary of the orphanage children was very decidedly inferior to that of the Iowa city school children studied by Smith. Thus present research indicates that a poor environment tends to result in poor vocabulary for a child, even if he is intelligent.

SPEECH AND IDEAS

The very first childish speech is definitely on a perceptual level, that is, it consists of responses to things seen, heard, touched, tasted, or smelled. Such speech responses Allport calls "naming habits," and he points out that these pass over gradually into "demanding habits." A child, having acquired the habit of applying a particular name to any object, for example, "da" for "doll," says "da" one day while looking at a doll out of reach. "He wants it," says mother, and proceeds to hand the doll to him. This being repeated, a connection is formed between the stimulus situation "sitting-and-fixating-on-doll" and naming of the object. If the mother did not repeatedly present the doll, the act of naming it while in the looking-and-reaching situation would not

¹² H. M. Williams and M. L. McFarland, "A Revision of the Smith Vocabulary Test for Preschool Children," Univ. of Iowa Stud. in Child Welfare, 1937, 13, No. 2, 33-46

be likely to be often repeated, since the child would soon respond to other more potent stimuli. Hence the baby in time develops the habit of "asking for" things which he sees or hears.

Symbolic Speech.—In the course of this perceptual development a very important transition is early made, that is, the transition to speech referring to *objects or situations not present*. Just when this habit of symbolic reference begins we cannot ascertain, largely because of inability to get an introspective report from the baby. But we have an objective indication of its presence in the occurrence of words consistently used in the absence of particular objects. How can this non-perceptual demanding be explained?

Allport explains the first demanding which occurs in the absence of the object as a response conditioned by practice in demanding when the object was present. In the course of that practice the response "da," evoked by the sight of the doll, would naturally become associated with the whole sitting-reaching-and-playing situation. Therefore after a time the response would occur in the absence of the object.

At first, presumably, the naming response does not involve thought of the absent object; but we must suppose that at some point in the development the baby not only names the object but *thinks* it without naming it. Or the pronunciation is accompanied by the thought. That there must early be such implicit symbolic reference is suggested by the behavior of the child who, when the correct object is presented, receives it and plays happily; but who if a different object is presented, shakes his head and will have none of it. In the former case, one may assume that the object brought is a stimulus fitting in with the complex inner and outer stimulus-pattern which is affecting the child, and that there is therefore an unimpeded and even accelerated continuation of the series of responses already in progress. But if an object not thought of is presented, it will awaken responses not already or incipiently in progress, and hence, as tending to break up ongoing activity, will arouse general negative responses, or even anger.

Having acquired the tendency to say "da" or think "da" when in certain bodily and general play situations, the baby is likely when in such situations to speak the word. If fre-

quently, when he does, the doll is brought to him, a habit of speaking the word "da," and starting to play with the object when brought, is developed. Finally the speaking of the word "da" becomes the natural response to the situation of sitting and "thinking" of it. At this stage we have the beginnings of that type of mental activity which we ordinarily call wishing or desiring. This involves a conscious thought response standing for an absent object, a response which tends to initiate in incipient form the reaching or approaching responses which would naturally be made to the actual object if it were present. The baby may be said to want or desire an object when in its absence he *thinks* it and tends to respond to that thought with associated incipient reaching movements or by naming the object. Such wishing must of course be very rudimentary, lacking the rich context of ideas, which later are likely to form a part of any desire.¹³

The Rôle of Language in Thinking. — It is clear that since spoken words are learned by the child these will serve along with the pre-verbal symbols which he has previously utilized, as a basis for thinking. Verbal activity will become organized and function in the adjustment of the child, on the same basis that overt responses and complex motor activity do. Apparently verbal conditioning may take place more rapidly than the ordinary type of perceptual-motor learning, and learned verbal responses or habits may be retained more efficiently than non-verbal ones.¹⁴ The words need not be spoken, of course. They may be written, read from a book, whispered, or said sub-vocally.

Sub-vocal or implicit speech is probably the most important, though not the only, carrier of meanings or material of thought. It is easy to trace in the development of the little child a transition from overt speech to such implicit "articulation." At first a baby says everything "right out loud." No one objects and there are no obstacles to such behavior. Soon, however, the child is told not to make so much noise, is taught not to speak when others are speaking, or is laughed at by older children when he "talks to him-

¹³ Cf Chap. V, p 205.

¹⁴ Cf the experiments of Hudgins and of Brogden *et. al.* cited in the chapter on conditioning; and also the suggestive monograph by E. B. Waring, *The Relation Between Early Language Habits and Early Habits of Conduct Control*, Teachers College, Columbia Univ., 1927, Contrib. to Educ. No. 260.

self." Children are often observed to carry on their playful talk in a low voice or in a whisper. Even that being frowned upon, what more natural than that the baby should cease the overt talk in certain situations, only the implicit part of the movement-pattern remaining to represent the object?

Such short-circuiting is a common feature of mental activity. We saw that in typical sensory-motor learning unnecessary movements tend to drop out, leaving only the essential series. We observe that in the process of ordinary conversation a person's name, if long, comes to be more and more abbreviated. Alexander is referred to as Alex, and to the initiated, Andy or Al is just as significant. The word "and" is at first written out in a schoolboy hand, then the flourishes disappear, and finally for many people only a little curlicue is left. As long as the sign can still call out appropriate behavior it is serviceable. The process of subvocal short-circuiting may be essentially the same. As long as there is any consistent remnant left of the original series of implicit and overt acts making up the word, that remnant, be it only a slight contraction of certain obscure muscles in the larynx or other part of the body, may still be the symbol of the object to which the whole word was originally a response. And experiments on conditioning as well as general theory would lead us to expect that as the "present item" or symbol for a particular object or situation, any one of a large number of such possible implicit patterns or remnants of patterns may function. There would be no one right way of thinking "mother."

These theories of thinking, abstract as they are, are nevertheless serviceable in enabling us to imagine how it is possible for a little child to become so capable in dealing symbolically with his world. They help to take the deep mystery out of this still marvelous development. They help us to realize that thinking is, not a gift from heaven, but an achievement of each individual child, a process of learning highly serviceable modes of adjustment. We shall not expect too much, then, of this purely human mode of adjustment, nor despair because mankind is still so irrational.

Subjective Aspects of Thinking.—When we ask how ideas can be described introspectively, we encounter serious difficulties, especially as far as animals and young children

are concerned. Reports of adults indicate that thoughts of a specific object are often accompanied by vivid sensory images of the object. Thus as a man thinks of the snow-capped mountain he climbed one time, he may shut his eyes and see a visual picture of it almost as clear as the original; or he may feel the cold of the staff he grasped, or smell the odor of the coffee he drank on returning. The images have a definite sensory character, with objective reference — the gleaming whiteness of the snow is actually seen, not merely thought about. Perhaps only a part of a scene recalled is imaged, for instance a particular slope of the mountain against the sky, while the rest, though it can be described in words, is not actually "imaged." Similarly, the cold may be actually felt, and the coffee actually smelled. The sensory images involved are to be carefully distinguished from the incipient shivering or sniffing movements which may be elicited in the recall. Failure to make such distinctions is an important source of error in investigations of imagery.

Studies of imagery in adult subjects who have been carefully trained in making reports indicate that sensory images are indeed often present during recall or in general thinking. It seems that a great deal of thinking, however, goes on with little or no imagery. The subject may be aware of sensations from movements of the throat or lips, indicating that "internal speech" is present, or of various shifting bodily strains, stresses, and gestures, but he is unable to relate these, usually, to definite thoughts.

There is good reason to suppose that a great deal of our thinking goes on, indeed, at an unconscious level, on the basis of almost automatic intraorganic symbolic responses. Evidence for this view is based not only on a consideration of introspective reports from experimental thinkers, but also on other considerations. The extreme rapidity of thought would only seem to allow time for the characteristically rather slow formation of definite images. Then, too, there are the records of problem-solving during sleep, and the frequent cases in waking individuals in which the solutions of problems suddenly "pop up from nowhere," to the surprise of the thinker. Finally, there is the evidence from clinical and general personality study that decisions which

appear to the maker to be fully rational, are often, indeed usually, based in part upon unconscious thought-mechanisms of the existence of which the subject is entirely ignorant.

But while images are apparently unnecessary for thinking, and certainly do not occur independently, as they are always based upon neural and motor processes, there is some evidence that the total situations of which they are aspects are, at times, of value in adjustment. Various investigators have concluded that images are likely to arise when there is some hitch or difficulty in recall or thinking, and that in such circumstances the subject, by striving to make the image clear, is sometimes able better to orient himself with respect to a concrete situation. Sometimes it seems, however, that abstract thinking is hindered by the intrusion of a definite image.

The general conclusion is that individuals differ greatly in the extent to which their thinking is likely to be characterized by images. For most people, however, it seems there is a tendency for images to appear in two circumstances: at points where there is some difficulty or conflict in thinking, and at points where there is an effort to recall a definite perceptual situation.¹⁵ Fernald did not find clear evidence that imagery either is or is not likely to be helpful in the first type of situation.¹⁶ It is suggested that in the second, imagery may serve an important function. For one thing it may increase for the subject the richness of his recall of a situation. He may take pleasure in contemplating vivid images as he once did in observing the concrete situation. Then too, if the situation to be recalled involves important memories, the effort to construct an image may be an aid in the desirable reinstatement.

This second function of imagery suggests that it may be particularly prevalent, and particularly important, in childhood. While the abstract thinking demanded of adults would be hindered by the presence of a good deal of concrete imagery, the child, whose chief task at first is to become acquainted with the surrounding world, may perhaps be aided

¹⁵ G. H. Betts, *The Distribution and Functions of Mental Imagery*, Teachers College, Columbia Univ., 1909, Contrib. to Educ. No. 26

¹⁶ M. R. Fernald, "The Diagnosis of Mental Imagery," *Psychol. Monogr.*, 1912, 14, 1.

in his knowledge of and appreciation of that world by concrete imagery.¹⁷

The theory that there is more concrete and more vivid imagery in children than in adults has long been urged. It has often been assumed, also, that the thinking of primitive peoples and of little-educated civilized adults is similarly rich in imagery. There is some experimental support for this theory as far as concerns children and adults of little education. In certain investigations these have reported a wealth of imagery as compared with older and better educated subjects.¹⁸ This evidence is, however, not really reliable, for untrained subjects generally tend to report vivid imagery, whenever they recall anything vividly, no matter in what terms the recall proceeds. They have not learned to distinguish between "having a vivid sensory image of an object," and "thinking clearly about the sensory qualities of the object." It may be that the results are due simply to the fact that the older and better educated subjects are giving more accurate reports.

Further evidence on the prevalence of imagery in childhood has been brought forward by German investigators. Psychologists in general, recognizing the extreme difficulty of getting reliable reports on imagery even from specially trained adults, had lost interest in the subject, when it was again stimulated in many quarters by reports of the investigations of Jaensch and his followers. They announced the "discovery" that some individuals have visual images of hallucinatory clearness, so stable and objective in reference as to be qualitatively different from the ordinary visual memory image. These "eidetic images" they found to be more frequent among children than adults, with the "height of the gift" fixed at 12 to 14 years, and a marked decline during adolescent years. The power to produce such images, they thought, varies not only with age, but with physiological factors such as rate of metabolism, with temperament, with stage of racial development, with nationality, and probably with other factors such as sex and intelligence. Upon their investigations they based an elaborate evolutionary theory of

¹⁷ G. W. Allport, "Eidetic Imagery," *Brit Jour. Psychol.*, 1925, 15. 99-120.

¹⁸ Sir Francis Galton, *Inquiries into Human Faculty and Its Development*, Macmillan, 1883, 99-100.

mental development and of personality types,¹⁹ which has, of late, proved useful to the government in present Nazi Germany.

The general method of study used by the German workers is to exhibit pictures, diagrams, and objects to the subjects, under various conditions, and then to have them look at a neutral background, reporting what they see. Using complex colored pictures as stimuli, Gordon W. Allport, working in England, did find that 50 per cent of his 11-year-old Cambridge school children were able to produce such vivid images as the Germans described.²⁰ Heinrich Klüver and other psychologists have obtained results showing unusual power of imagery for certain subjects.²¹

The experimental data on eidetic imagery may be interpreted in various ways. Allport presents arguments to show that in some cases what Jaensch and his followers called eidetic images must have been in reality ordinary visual after-images; and that in other cases the images were simply unusually vivid memory images.²² But the investigations of Klüver and others, including Allport, have shown that unusually vivid images which are not after-images, are present in some subjects; and this fact is significant whether we call the images eidetic, or speak of them as memory images.

Meanwhile we may continue to gather data on children's thinking through the study of their speech or their written language, of their drawings, their constructions in play, and their general varied behavior in problematic situations. Chiefly through the study of this objective material, the writer believes, we shall increasingly gain a useful understanding of childish thought. It would be of interest to know also what conscious processes, such as sensations or

¹⁹ E. R. Jaensch, *Die Eidetik*, Leipzig, Quelle & Meyer, 1925, also "Über Eidetik und die Typologische Forschungsmethode," *Zsch. f. Psychol.*, 1926, 102. 35-56

²⁰ G. W. Allport, *op. cit.*

²¹ Heinrich Klüver, "An Experimental Study of the Eidetic Type," *Genet. Psychol. Monogr.*, 1926, 1: 71-230; also the same author's article with bibliography, "Eidetic Imagery," in the *Handbook of Child Psychology*, Clark Univ. Press, 1933, chap. 17, 699-722; H. Teasdale, "A Quantitative Study of Eidetic Imagery," *Brit. J. Educ. Psychol.*, 1934, 4: 56-74; J. E. Rauth and J. J. Sinnott, "A New Eidetic Phenomenon," *Child Develop.*, 1937, 8: 112-113.

²² G. W. Allport, "The Eidetic Image and the After-Image," *Amer. Jour. Psychol.*, 1928, 40: 418-425.

images, accompany the thinking which we are studying. But such a knowledge would, it seems to the writer, aid little in understanding why children think. It would enable us merely to add descriptions of subjective states to our objective formulations; and such addition would serve merely as minor supplementation of the main treatment. The backward state of the study of imagery need not, therefore, discourage the student of child psychology. The discussion of this whole topic will have illustrated for the student some of the difficulties and weaknesses of introspective methods in general, especially as applied to children.

SUGGESTIONS FOR READING

Every student of psychology should be familiar with at least one of the studies of the delayed reaction cited in the text. Hunter's pioneer "Delayed Reaction in a Child" is one of the most readable, and employs the direct method. . . Dorothea McCarthy's *Language Development of the Preschool Child* presents an interesting picture of language development, though in somewhat restricted situations, while Dr. Mary Fisher's *Language Patterns of Preschool Children*, analyzes the total language output of her subjects over a given period of time . . . Markey's *Symbolic Process* and Lewis's *Infant Speech* are books representing very different points of view, but both present much factual material as well as theoretical analyses. . . Piaget's *Language and Thought of the Child* is one of the books which every student should examine. . . There are many books on stuttering and other disorders of speech. A useful one is *Speech Disorders* by Sara M. Stinchfield.

CHAPTER XI

THE GROWTH OF MEANINGS

WHAT is implied in saying that a child learns the meaning of a word or an object? If we first consider concretely how a particular word, let us say the word "mother," may acquire meaning for a child in terms of everyday experience, we shall better be able to analyze the psychological mechanisms involved.

To the baby a few months old the word *mother* means no more than any other combination of sounds. After he has heard the word repeatedly applied to his own mother, however, it has begun to take on meaning; for now when the mother herself is absent, and he hears the word, he may respond to it with some of the behavior which was formerly called out only by the mother herself. A year-old baby, told "Mother is coming," may begin excitedly to rock back and forth in his crib, to smile and coo. After the child has begun to think, the word *mother* may evoke ideas, as well as emotional and overt responses.

Now as time goes on the child reacts to the mother, and to the word *mother* which is applied to her by himself and others, in an ever-widening variety of situations. She feeds him, and the name is thus associated with (tends to call out) pleasant feeling responses connected with the dinner hour. She bathes him, caresses him, tells him stories, and tucks him in bed with a goodnight kiss. Thus the word *mother*, heard when the actual person is present, comes to elicit many positive reactions, and when the child is old enough to think about his past experience, many related ideas. The word becomes capable of reinstating less pleasant responses, too, for the mother may slap his hand when he snatches at food, or speak solemnly to him when he is naughty. Hence the word *mother* comes gradually to mean refraining from harmful actions.

In early childhood this word is likely to call up ideas of goodness, even of perfection. The mother answers all the

questions the child can ask, and she tells him what is good and what is bad. Therefore he comes to think of her as an authority and a judge.

With the experiences of his later childhood, the meaning of the word *mother* alters still more. The child learns that his mother suffers, and that she makes mistakes; and when people speak to him of his mother, he may think of these things too. For a child whose mother has left home, has died, or has become insane, the word becomes charged with very special meaning. It may now evoke tears, disturbing terror-dreams, or feelings of loneliness and depression.

In later years, when the child, approaching maturity, has had wide acquaintance with other mothers than his own, in actual life as well as in books and plays, the word *mother* usually has much richer meaning than it did in childhood. For children brought up in accustomed ways, the word will have a more or less standardized meaning—it will have been associated with certain common experiences. But for each individual the shading of meaning will vary according to his special experience and the social maturity he attains.

NATURE AND KINDS OF MEANINGS

When we say that the word *mother* means something to the child, we imply simply that this stimulus is capable of eliciting a variety of appropriate responses, mainly implicit, before any overt action is taken. To say that the child knows the meaning of a word does not mean that he experiences a definite something called “meaning,” but merely that the word is a potential stimulus for varied responses—for attitudes, feelings, ideas, and sentiments. The word *meaning* is an abstract term to denote this fact.

We may now make a generalized statement of the process by which a child learns the “meaning” of an object. The reaction is always to the object in a situation. In the course of repeated experiences, reactions are made to the same object in varying situations. Whenever the total situation of which the object is a part varies, the reaction too changes. Thus a variety of responses comes to be associated with the object. Hence when the object is later encountered the child does not react to it as he formerly did, but some of his re-

sponses are those which were called out by other parts of past situations. Thus the child reacts to these in their absence; and the wider the variety of situations in which he has encountered an object, the more meaning responses is that object now capable of eliciting.

According to this conception the word meaning is not applied to instinctive adjustments, however complex and however adaptive. It is applied merely to adjustments which involve not only some retention of the effects of past experience, but also interpretative implicit response by the individual.

We may classify meanings as perceptual, and call them perceptions, if they refer to objects actually present; or as ideational, if they refer to objects not present. When a child is reacting meaningfully to an object or situation which is actually present, we say that he is perceiving the object or situation, and we call the process perception; but when he is reacting with reference to absent objects or situations we say that he has ideas, ~~or~~ that he is thinking.

It is through the gradual acquisition of experiences and their organization that the child's world becomes meaningful to him. A child's behavior may be well organized and highly adaptive, as in the case of the neonate, and have plenty of meaning for the adult observer but little or none for the child himself. While perception and ideas are always closely related in actual behavior, and function always as aspects of the total behavior of the individual, we shall analyze them separately in order to see how they are acquired and how the acquisition may be guided.

PERCEPTUAL MEANINGS

We shall now try to see what actual evidence we have from observation and experiment that the generalizations we have made about the growth of meanings apply to interpretations of present objects; and shall then describe the chief features of childhood perceptions.

A perception is a preliminary interpretative response to a present object. It is dependent upon the character of the subject's past experience in reacting to the object, and also upon the nature of the total present situation in which the

object is experienced. As a part of that situation we must include any motivating conditions which may be present at the time. Varying physiological conditions of the organism, such as hunger, satiety, fatigue, drowsiness, or "general vitality" may enter in as parts of the stimulating situation to influence the nature of the perception. A chocolate rabbit to a child who has had his Easter dinner may call out the meaning response "I'll play it's a horse and let it draw my toy cart," but later when the child is hungry, the total stimulating situation being different, the meaning responses may be represented by "I'll just take one bite." At one time the rabbit means plaything, at another time candy. Not only physiological motivation but "mental set" or expectancy, whether conscious or subconscious, may influence the perception. One warm day the author, then a college student of psychology, was sitting on the front porch idly daydreaming, when suddenly she straightened up in startled attention as a remarkable many-legged beast, about the size of a cow, dashed up the terrace across the street and made for the corner of the house. In a moment she realized that the animal was actually a mosquito moving along the edge of a leaf on the vine that partly screened the porch. This is strictly in accord with the fact that it is not the size of the retinal image alone that determines our perception of size, but also surrounding objects. But why the wild beast? A moment's thought answered this question. Barnum and Bailey's circus was in town, and established on a lot in the same part of the city. Apparently a subconscious mental set was the chief factor in the illusion.

Again, as part of the internal motivating situation various ideational motives, including desires, hopes, and purposes, may, as we shall show in the next chapter, help to determine the perception. For example, to a child who is constructing a make-believe country estate, his sister's new blue ribbon seems made for a trout stream. One aspect of the present situation is, of course, the structure of the perceiving child. Like every other kind of human activity, perceptual activity involves bodily activity and instinctive adjustments. In some types of perception these organically based or innate factors are doubtless more prominent than in others. For example, in the field of space perception the perception of

position (whether an object is above or below, right or left, etc., of another) probably depends far more upon the specific experience of the individual (learning) than does the perception of form. And the perception of small differences in odor or taste or symmetry probably involves more learning than the perception of either position or form. By its very definition, as involving *interpretation*, all perception involves some learning, but the amount and the time taken in the learning we should expect to vary with circumstances.

Methods of Studying the Origin and Growth of Percepts.—In the nature of the case it would be difficult to secure accurate information on the extent to which a particular sort of perception is related to the experiences of the individual child. We could not very well use the method of co-twin control or sufficiently restrict the experience of a large control group of infants to enable comparison with a normal group. We do have evidence, from the case of children either born without the use of a particular sense organ or deprived of it at an early age, which indicates that no particular senses are essential to the perception of space, time, and objects. Helen Keller perceives space largely in kinæsthetic and tactual terms, apparently, and music (rhythm and intensity) through touch. The few reported cases of people born blind whose sight has been restored through an operation might furnish crucial evidence as to whether spread-outness in visual perception is innate, but unfortunately the reports on these cases are ambiguous.

The basic perceptions of children must begin to take form early in infancy, so that a child of two must be very sophisticated with respect to the perception of objects, space, and to a certain extent, time. Before that time, indeed for some time after, he is unable to give us accurate reports of his inner experiences or to use common terms (bigger, redder, closer, etc.) to describe them. Hence all our evidence must be indirect.

We must be very careful, however, about making inferences concerning perceptive ability from performance, whether spontaneous or experimentally induced. Psychologists have been in the habit of assuming that the drawings of children are an index of their perceptual development. A chance observation of the author's is illuminating in this

connection. Her little girl, aged five, had drawn many pictures of people in the usual childish fashion. She had now arrived at the "stage" of furnishing her people with fingers as well as hands, but drew them merely as marks, sometimes few, sometimes many — sometimes five to a hand. One morning the author filed away a drawing of a man (See Figure 29) with many fingers; and in the afternoon picked up from the child's desk a carefully executed sketch showing a single hand with little finger crooked. Hardly believing her eyes she put this away and next day casually asked the child to make a picture of her (the mother's) hand. The result, executed without hesitation, is shown in the figure with the man. Then the author asked about the picture the day before, and she replied, "I wanted to show how my hand looks when I do this," (crooking her little finger). This child went right on with her childish free drawings and her people still had varying numbers of fingers. But her drawing showed less than we might think about her perceptual development.

The work of Skeels furnishes an illustration from experiment.¹ Children were required at one time to insert certain geometrical forms or object-forms into the proper holes in a form board; at another, merely to identify the forms. They could do the latter but not the former. In other words the complexity of the performance masked the perceptual ability that was there.

Evidence of Learning in Perception.—With this introduction we may proceed to consider some of the evidence that we have, in spite of the difficulties inherent in the problem, for growth or learning in the development of percepts. In some percepts this learning must proceed rather gradually, with a good deal of trial and error, while in other percepts there may be so little trial and error that the learning is hardly recognized. As an example of gradual learning in perception we may take the case of the tea-taster who knows instantly whether the tea leaves in the brew were dryer than, or greener than, or otherwise different from the usual blend. Such an ability is the product of years of experience. An example of quick learning is the process of recognizing a

¹ H M Skeels, *A Study of Some Factors in Form Board Accomplishments of Pre-school Children*, Univ of Iowa Stud in Child Welfare, 1933, 7, No. 2.

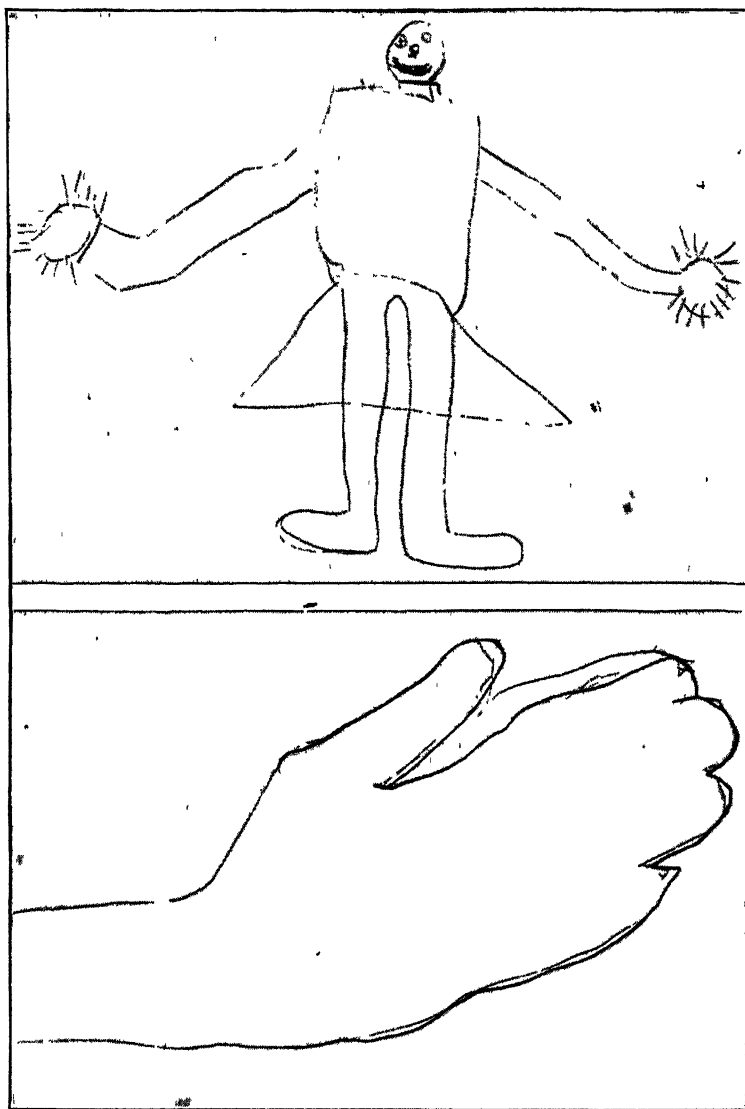


FIG. 29 SPONTANEOUS DRAWING OF A MAN, AND REQUESTED DRAWING OF A HAND, BY A CHILD AGE $5\frac{1}{2}$ YEARS

familiar figure in a picture puzzle. Suddenly, though after some preliminary guessing (trial and error), the figure flashes out at us. This is because we come to the situation with a background of previous familiar percepts and memories, all "set," moreover, to see one of a rather narrow range of objects. Robert Leeper has urged that this sort of learning which, as he says, has been neglected, be treated as a special type of learning, "sensory organization."²

Without any attempt to summarize what is known about children's percepts even in a particular field, we may consider certain indications of perceptual learning. We shall first illustrate learning in a type of perception which is as stable as any we have—space perception, and shall then take illustrations from a few other types of perception.

1. *Evidence from space perception.* Experiments on adults show that a spatial situation, once broken up, will gradually be reorganized into a stable perceptual system. A famous example is the experiment of Stratton, who for about two weeks wore lenses which completely reversed directions in the world of visual space. Objects which were really at his right appeared to be at his left, and objects below him appeared to be above. Thus a stairway which led down appeared to him to lead up. At first things *looked* upside down to him, and he constantly made mistakes in reacting to common objects, because his perception of their location was faulty. Slowly, however, through repeated reactions, he learned to make the correct adjustments to these objects, and as he did so, the objects came to look "right"—the world again looked right side up. Of course the objective position of things was not changed.³

The writer carried out a similar experiment on 40 subjects who wore prismatic spectacles which displaced objects 20 degrees to the right. All of the subjects, although ignorant of the conditions and the normal appearance of the room in which they worked, gradually but surely learned to react correctly. It is significant that Stratton observed that he learned

² Robt. Leeper, "A Study of a Neglected Portion of the Field of Learning—The Development of Sensory Organization," *Ped. Sem. & J. Genet. Psych.*, 1935, 46: 41-75.

³ G. M. Stratton, "Vision without Inversion of the Retinal Image," *Psychol. Rev.*, 1897, 4: 341-360, 463-481.

first to re-perceive correctly the objects which he handled most actively, and that the writer found that no readjustment took place without active localizing movements.⁴ To the adult, nothing seems so fixed in the nature of things as objective space, as "up," "down," and "square." These experiments indicate, however, that such perceptions depend on our specific human experience with things in reacting to them. "Up" means where our arms are, "down," near our feet, and so on. Such experiments have demonstrated the possibility of a gradual trial-and-error acquisition of perceptions of direction and distance in children.

Dr. Ruth Updegraff found that children two and one-half to about three and one-half years old did not understand the meaning of the words "nearer" and "farther" and used them with a personal reference. A group of ten children between four years two months and four years ten months did use the words accurately and could distinguish about as small differences in distance in an artificial laboratory situation as six adults, but their judgments were much less consistent.⁵ Four of the ten children, but no adults, interpreted the converging line of stimulus as farness. The judgments varied with such factors as changes in linear perspective and other conditions, indicating an effect of "environmental conditions."

Thus even in four-year-olds who were very sophisticated, from the point of view of experience in spatial situations, there is indication that the meaning of some common cues of distance (such as perspective, shadows, and relative size of objects) has not been completely learned. We should expect to find in children's reactions in everyday life even more remnants of a probable infant incapacity to make correct spatial interpretations.

Ordinary observations of spatial reactions in children do give evidence of a naive interpretation of distance, form, and size in young children. Psychologists have questioned the

⁴ Margaret Wooster (Mrs M W Curti), "Certain Factors in the Development of a New Spatial Coordination," *Psychol. Monogr*, 1923, 32, No 4. See among later studies in this field P H Ewert, "A Study of the Effects of Inverted Retinal Stimulation upon Spatially Coordinated Behavior," *Genet. Psych Monogr*, 1930, 7 177-363.

⁵ Ruth Updegraff, "The Visual Perception of Distance in Young Children and Adults A Comparative Study," Univ of Iowa Stud in Child Welfare, 1930, 4, No. 4.

old belief that the baby reaches for the moon, but the desirable experimental tests have not been made. If a distant object is bright and clearly in the field of vision, infants are very likely to reach for it, according to common observation. The author's little girl, aged two, reached several times for a hat which had been hung on the branch of a tree several feet above her head, each time bringing her thumb and fingers together in a grasping movement.

Faulty perception of size is illustrated by the case of the little boy taken at the age of three on his first trip by train, who exclaimed with delight at the "little tiny horses" he saw from the window on the other side of a field. He had seen horses only at close range in the city streets, and these which objectively were smaller, that is, which made a smaller retinal image, he actually believed to be midget horses, not making the unconscious correction which is made by adults who are more familiar with horses. Very young children frequently make similar mistakes. They look from high office buildings and see on the street below men smaller than themselves; they see flying in the sky birds as big as cows. At four years old one of the author's little girls exclaimed excitedly when, from the parked car, she saw her father walking down the street, "O look, Daddy's getting smaller and smaller!" Many such remarks suggested that this child, an unusually articulate one, actually "saw" such things quite differently from adults.

As children run about and actively explore the house, the neighborhood, and wider areas, as they read and talk and think, the naive space perceptions of the earliest years become more accurate. It seems to be only repeated experience in looking, reaching toward, walking to and around, and touching distant objects, which gradually enables the child to interpret distance correctly without actual exploration. Experiments have shown that the spatial meaning of a distant object depends upon such factors as the muscular strains of accommodation and convergence, the presence of intervening objects and shadows, and the degree of mistiness or clearness of the air.

Since habits of correct response to such changing stimuli are only slowly built up, in older children and even in adults mistakes still occur. For example, an adult accustomed to

the hazy air of New England will make absurd mistakes in judging the distance of mountains in Arizona. But since our interpretation of distance depends upon a gradual process of learning to interpret sensory signs, a New England boy who goes to live in Arizona may, by the time he has grown up, be as good a judge of distance as a native.

2. *Perception of spatial relations in reading.* The fact that our ordinary ideas of the "right" position for letters in a word, letters and lines on a page and the like, are purely conventional or the result of learning is illustrated by experiments in which children were found to show no tendency to follow a left-to-right order in placing pegs on a board.⁶ The same thing is illustrated in the universal occurrence of some or many letter reversals in young children's first writing.

It is well known to parents that children at first recognize their favorite pictures and some words just about as well when upside down. The child referred to above illustrated this strikingly when she read aloud to her incredulous mother, smoothly and at the usual rate, from Pennell and Cusack, *The Children's Own Reader*, Bk. II, eleven pages of the story about Jimmie and Beverly. For at least the first two pages this six-year-old who had been reading for only six months was holding the book quite upside down!⁷ The author from where she sat could read the text rightside up and saw that not a mistake was made for two pages, but did not check the rest of the reading. She may have read the last few pages in the usual position for when she closed the book it was rightside up. Children gradually, but rather soon, learn the conventional usages and lose their ability to see under such varied conditions.

3. There is a gradual increase during early childhood in accuracy of *time perception*. This is notoriously undeveloped in young children. "A day to childhood seems a year," and confusion in judging time is expected. Terman places in the sixth year the ability to tell the difference between morning and afternoon. Although some good work has been done on

⁶ B. T. Baldwin and B. L. Wellman, "The Peg Board as a Means of Analyzing Form Perception and Motor Control in Young Children," *Ped. Sem & J. Genet. Psychol.*, 1928, 35: 389-414

⁷ For a study of the recognition of forms in different positions see S. M. Newhall, "Identification by Young Children of Differently Oriented Visual Forms," *Child Develop.*, 1937, 8: 105-111

this problem,⁸ there is great need for genetic studies of time perception in children.

4. Striking illustrations of the principle that stimuli take on adequate meaning only with experience are afforded by the observation of *the process of learning to understand a foreign language*. What at first is a vague jumble of sounds to the adult, with only crude rhythms and the emergence of some nonsense syllables, comes in time to arouse differentiated and appropriate responses—in other words, to be perceived as an ordered system of sounds. We may suppose that something like this takes place in the inner experience of the infant as he masters his own tongue. Childish experience with words continues to result in misinterpretations even after a large vocabulary has been acquired, as numerous anecdotes testify. When the writer was a child her mother used to admonish her after a prick or cut or burn, "Now remember, grin and bear it!" For years she heard this as "Grin and Barrett," and supposed that these presumably kindly old grocerymen lived in her mother's old home town in another state. One college girl confessed that until her senior year she had supposed there was a verb "to unsh." This idea was based on a misinterpretation of the phrase "unshed tears."

5. Trial-and-error learning in the growth of perceptions can be clearly observed in *the progress of individuals subjected to special training* which increases accuracy of discrimination along particular lines. The tea-taster and the expert judge of woolen cloths are the product of long experience in reacting to minute differences in stimuli; and little children are sometimes trained to develop abilities almost as remarkable. One little boy was purposely trained in outdoor lore from an early age, and at 12 he could identify many varieties of trees with his eyes shut, merely by listening to the sound of the leaves in a slight breeze. The value to the child of such a specialized ability is questionable, since psychological experiment teaches that training of this sort does not increase the ability to make fine discriminations in general. The case is, however, a good illustration of the importance of specific experience in helping to determine the accuracy of perception.

⁸ E. C. Oakden and M. Sturt, "Development of the Knowledge of Time in Children," *Brit. J. Psychol.*, 1922, 12 309-336.

We need more detailed evidence on special aspects of perceptual growth. Some valuable data we may expect from reports of observations of the growth from year to year of specific perceptions in individual children. Experimental studies, too, may be employed with younger children, and should some time give needed definiteness to our descriptions of perceptual growth. Meanwhile the lines of evidence which we have cited seem beyond question to establish the fact that even in very stable perceptions trial-and-error development does take place.

Characteristics of Perceptual Development in Childhood.—The tendency to react unanalytically to the whole is so strong in children that it may be said to be one of the special characteristics of early perception. In dealing with those characteristics we shall first discuss this tendency, which psychologists have called *syncretism*.

1. *Perceptions tend to become more analytical as the child grows older.* A baby after learning to call his father "daddy" may call any man he sees "daddy." Later as he is checked on certain occasions when he responds thus, he may apply the word "daddy" only to dark men with mustaches, and still later only to his own father who is dark and has a mustache. A certain little girl for some time applied the name "string" to every long twisted object she saw, whether wire, hair, cord, or ribbon. In standardizing the Binet tests it was found that very young children could not tell what parts—such as nose or ears—were missing from pictures of the human head.

The perceptions of early childhood which are thus likely to depend upon general patterns or schemas, inhering in total situations, may be said to be syncretistic, that is, the objective situation touches off natural interpretations according to the child's experience, without reference to conflicting details to which he has not yet learned to respond.

The fact that perceptions of adults also are syncretistic is illustrated by experiments with the tachistoscope, an apparatus by means of which letters, words, geometrical forms, and the like, printed on cards, may be exposed for a very brief interval. Even if the interval is so short that the details on a given card can not be distinguished, the object (word, figure, and the like) may be identified on the basis of the general

pattern of the situation, as suggested for instance by one or two clear details and the spatial arrangement of the rest. But this syncretism in perception is much more characteristic of the child than of the adult. In fact the first perceptions must be syncretistic, and analysis necessarily come later.

That a very natural course of development is from syncretism to analysis is illustrated by the first responses of young children to story books. For example, a two-year-old child, although he could not identify a single letter or a single word, was able to find in his book any of his favorite poems or stories which were asked for. "Little Jack Horner" or "Ba ba, black sheep," must have been recognized on the basis of the general "look" or pattern of the page. The word method of teaching reading, prevalent now for years, is based on the realization that it is natural for the child to react to whole words first, and only later to read by the putting together of previously perceived letters. Thus psychology teaches that by the analysis of wholes the first development in perception proceeds.

Since there is this development with age from the general to the specific, we might logically expect that children would be more subject than adults to certain optical illusions. This is because in these figures the perception of certain parts is influenced by the nature of the whole figure to produce the illusion. For example, in the famous Müller-Lyer figure of two lines which are actually of the same length, that one is perceived as shorter which is enclosed by "arrow tips" pointing outward. (See Fig. 30.) Some preliminary observations suggested that children are thus more susceptible. But a careful study by Hartmann and Triche affords no support

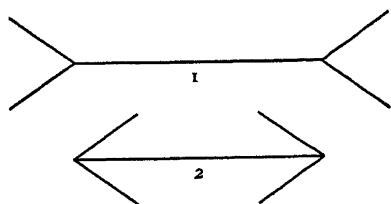


FIG. 30. THE MÜLLER-LYER ILLUSION

Lines 1 and 2 are equal in length.

for the statement. Using 60 to 75 subjects in each of three groups, six- and seven-year-olds, ten- and eleven-year-olds, and adults, they found no significant differences between the groups. The judgments varied according to the particular illusion studied, and from person to person.⁹

Another type of support for the "whole" character of childish perception has been sought in experiments on "relative choice." In 1913 Bingham published a report of experiments in which domestic fowls had been trained to go to the

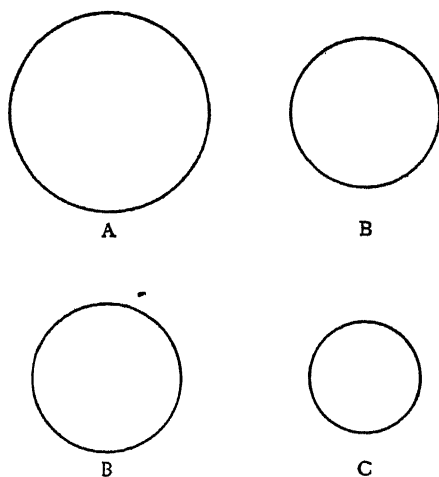


FIG. 31. REACTION TO RELATIVE SIZE BY CHICKS

Diagram based on description by H. C. Bingham, "Size and Form Perception in *Gallus Domesticus*," *Jour. Anim. Behavior*, 1913, Vol. III, No. 2.

larger of two circles (A) for food. (See Fig. 31.) After this training he substituted other circles (B and C), the larger of which, B, was the same as the smaller circle in the training series. The chicks now went at once to circle B.¹⁰ Five years later Köhler reported very similar results for four fowls, which learned to react correctly to the lighter of two shades of gray, regardless of the absolute stimuli employed. He

⁹ G. W. Hartmann and A. Triche, "Differential Susceptibility of Children and Adults to Standard Illusions," *Ped Sem & J Genet. Psych*, 1933, 42 493-498

¹⁰ H. C. Bingham, "Size and Form Perception in *Gallus Domesticus*," *Jour Animal Behav*, 1913, 3 65-113; also the same author's "Visual Perception of the Chick," *Behav Monogr*, 1922, 4, No 4, 104.

showed that the same thing happened with a boy nearly three years old, and with several chimpanzees.¹¹

Since this early work considerable experimentation on both animals and human beings has shown that there is a good deal of reaction on the basis of relative rather than absolute qualities. But whether there is or not does not seem to be related to age or naïveness but to various factors including the nature of the problem. There is no evidence that children use this mode of reaction more than adults.

We may illustrate by citing one experimental study on children. H. E. Jones and Dorothy Dunn conducted a learning experiment on eighty kindergarten children using cards representing different sizes, thicknesses, degrees of redness, and degrees of brightness. Rewards were "prizes."¹² There was found to be no general tendency toward either absolute or relative choice, but there were wide individual differences. The frequency with which relative choice was made had no relation to mental or chronological age within the group but was related to the efficiency of the original learning.

These recent results on illusions and relative choice, however, give no indication as to whether much younger children may not respond in the expected ways. By the age of five or six a child has perhaps passed clear out of the early very synthetic stage. The author inclines to entertain this hypothesis.

Leaders in the German school of *gestalt* psychologists have attached very special significance to such experiments on perception as those given above. The experiments illustrate the central emphasis of their doctrine, namely the importance of "*gestalt*" (which may be translated "form" or "configuration") in determining the apprehension of a situation. The total configuration, the *gestalt* psychologists insist, is the basis of the perception, and not elements of the situation reacted to as such.¹³

Under the conditions of Bingham's experiment with the circles, the perceptual response must have involved meaning

¹¹ W. Kohler, *Nachweis einfacher Strukturfunktion beim Schimpansen und beim Haushuhn*, *Abh. d. Preuss. Akad. d. Wiss.*, 1918, 45-48.

¹² H. E. Jones and D. Dunn, "The Configurational Factor in Children's Learning," *Ped. Sem. & J. Genet. Psych.*, 1932, 41: 3-15.

¹³ See K. Koffka, *The Growth of the Mind*, Harcourt Brace, 1928, 145-148; and W. Kohler, *Gestalt Psychology*, Liveright, 1929.

only with respect to the total situation and not with respect to the individual circles. We can not even talk intelligently about the "meaning of circle A," for the meaning as perceived and learned is apparently attached to the total single situation of which circle A is merely a part without any meaningful identity of its own. To say that in the first series circle A was perceived as "something to approach" while in the second series it meant "something to avoid" would be to misstate the case entirely. In the first series the meaning was that of a single situation with two parts and a single response to the whole: it did not involve a positive response to circle A and a negative response to circle B, but rather a single response of going toward the *part* of the whole which was smaller.

Such an interpretation, the student will see, is in line with the trend of modern functionalistic psychology, which has emphasized the importance of organization, integration, and pattern in behavior. The theory that a perception is built up out of a number of simple sensory qualities which may be perceived as independent elements with an absolute value of their own is perhaps consonant with the old elementaristic Wundtian psychology once very prevalent, it seems, in Germany; but it has no defenders either in the more traditional functional type of psychology in the United States or in the contemporary objective psychology which has grown out of it.

The *gestalt* psychologists have called attention, in their peculiar terminology, to an important feature of perception which, although it has long been recognized, has been unduly neglected in theoretical discussions. It would seem, however, that the importance of such experiments as those made by Bingham and later by the *gestalt* workers, has been exaggerated. There is no reason why psychologists should be astonished that Bingham's chicks reacted to the relative and not to the absolute size of the circles. After all, size has to be relative to be judged at all! The same consideration holds for Köhler's experiment with the grays. It is well known that the brightness value of colors or grays changes markedly according to the illumination and the distance, and hence in any experiment on discrimination the absolute values vary from trial to trial or from day to day, unless the factor of brightness is kept experimentally constant. In the color

perceptions of everyday life, when distance and illumination vary considerably with different observations, this principle must, then, be constantly illustrated. The author, then, is in sympathy with the *general* position of the *gestaltists* but she believes that a functionalistic explanation is more serviceable than the vaguer terms of *gestalt* doctrine.

The child's drawings, since they show increasing attention to detail as he grows older (cf. Figure 32), are said to furnish evidence of perceptual development from the general to the specific. But as we have already suggested these drawings do not necessarily mirror the child's perceptions, which are after all inner interpretations observable only by



At 3 yr. 6 mo. At 4 yr. 11 mo.

FIG. 32. TYPICAL DRAWINGS OF A CHILD AT DIFFERENT AGES

From Ernst und Gertrud Scupin, *Bubi's erste Kindheit*. (Copyright by Grieben, Leipzig, 1910. Used by permission)

the child himself. Unquestionably the child notices more details as he grows older; but we submit that while still very young (between two and five) he recognizes and can think effectively about many more details than appear in his drawings. Children's drawings are crude and general as they are partly because of lack of constructive drawing ability, partly because they are not trying to show all they know—their drawing is, perhaps, primarily play. Their satisfaction with their efforts does indicate a lack of close critical attention to detail, but not, we suggest, a lack of related perceptual activity in their everyday lives. The author has observed that one of her children, at four years of age, at the same time she was drawing vague, general pictures of people, frequently remarked on some slight detail of appearance (a freckle, a tiny hair, an irregularity in a tooth)

in a member of the family. The same child criticized many of her early drawings. For example, "That's a rabbit—I can't make it better—I can't make his feet."

Nevertheless drawings do reflect, probably, the dominant type of *interest* which the child has,¹⁴ and the fact that more and more details are likely to be included as the child grows older is thus indirectly related to this syncretism. Probably the thoroughgoing naïve syncretism of the child is a thing of the past by the time he begins to express himself intelligibly—in fact it passes partly *because* he learns to express himself intelligibly, and the syncretism we see reflected in his drawings and his thought is merely an echo, so to speak, of an earlier period. Thus neither the experiments on illusions and relative choice nor the evidence from children's drawings is necessarily in conflict with our statement about the increasingly analytical character of children's perceptions. It seems probable that the original syncretism of these perceptions is very early profoundly modified.

2. *Perceptual growth is marked also by progress from juxtaposition toward synthesis.* Not infrequently children fail entirely to react to a complex object as a whole, but instead single out details which may be quite unimportant and ignore their relationship to the rest. This is well illustrated in spontaneous drawings. For example, a young child may draw his toy auto, showing the large round steering wheel between the two wheels beneath the box, and be perfectly satisfied with the effect. Volkelt reproduces a plasticine figure of himself made by his daughter, nearly five years of age. The teeth are shown as a row of round objects on top of the head, and the mouth as a ball some distance below the head!¹⁵

Piaget says that such interpretations illustrate the phenomenon of "juxtaposition," or mere placing together of parts irrespective of relation to the whole. He points out that as the opposite of syncretism, juxtaposition plays a complementary part in the growth of accurate perceptions.¹⁶ Neither the syncretistic type of interpretation nor mere juxtaposition is

¹⁴ See E. B. Hurlock and J. L. Thomson, "Children's Drawings: An Experimental Study of Perception," *Child Development*, 1934, 5: 127-138.

¹⁵ H. Volkelt, *Fortschritte der experimentellen Kinderpsychologies*, Jena, Fischer, 1926.

¹⁶ Jean Piaget, *Judgment and Reasoning in the Child*, Harcourt Brace, 1928, 58, 59.

adequate, the former often ignoring important features of the objective situation; the latter neglecting important relationships. If an accurate perception of a situation is to be acquired, both the whole and the parts must be reacted to and finally come to be synthesized in a significant interpretation.

It may be pointed out that, after all, whether a given perception be regarded as analytic or syncretic depends upon the point of view of the adult observer, and is not an inherent characteristic of the child's response. The model of her father made by Volkelt's daughter may be judged in two ways. If the child's task was to show another person what her father looked like, as a person, then the illogical grouping of the parts represented simply inadequate juxtaposition. But if we look at the reproduction to see how well the schema or "idea" of certain important parts of the body has been shown, we see evidences of syncretism. As a matter of fact, the child's representation of the teeth *was* syncretic as far as the teeth were concerned—only a few were shown, and they were grouped in a semicircle in a schematic way. Whether the adult observer sees analysis or syncretism, then, in the perceptions of the child, depends upon the particular part of the objective scene he has in mind. And certainly in the building up of effective interpretations of any one fairly complex object in his environment, the child must react now to the object as a whole, now to parts, and finally to the whole again. The final development of an adequate interpretation of any objective situation must involve a synthesis based upon the complementary and interacting processes of syncretism and analysis.

3. In addition to the inadequate synthesis which they betray, *the perceptions of young children are likely to be still further distorted by the influence of the personal factor*, or by what we might call, using Piaget's term, his egocentrism. The child is at first, of course, a non-social being, and only gradually acquires knowledge of the needs and the experiences of other people. At first, therefore, it will be his own needs and his own experiences which predominantly enter into the total stimulating situation to influence his interpretative responses to others; and only gradually will knowledge about and interest in the experience of these others be

important factors in his social perceptions. In the next chapter evidence for this egocentrism will be considered.

The more narrow and personal character of the perceptions of children as compared with those of adults is particularly well illustrated in various stories of childish misinterpretation. One young woman known to the author thought for years, as a child, that the minister was referring to her dear Aunt Leta whenever he said the Lord's Prayer, "And lead us not. . ." A little girl may regard her baby sister merely as someone in the way instead of as a future dear companion. To a child a bent old man shuffling along the street may seem merely funny. More rapidly in some children than in others, according to their natures and their training, do situations involving other people come to be adequately interpreted.

The fact that children's perceptions tend to become, as they grow older, increasingly more analytical, more logically organized, and more impersonal, may be expressed in the statement that with increase in age comes increase in accuracy. The perceptions of the young child are bound in the very nature of the case to represent, often, confusions between recalled and imagined data, to be distorted by childish interests and childish ideas, to be very inadequate as representations of reality. On the other hand, they may reflect what sometimes seems to be uncanny emphasis on important features of a situation. In their spontaneity and their symbolism they may be fresh and poetic in a way not possible in the more accurate and practical perception of adults. But the perceptual meanings of an adult's world, although often less æsthetically satisfying than the child's, are of course more serviceable in making possible effective adjustment. For all their charm, childish interpretations as well as childish speech and childish manners must be early put aside if the individual is to develop normally toward maturity.

The treatment of perception implies the importance of ideas and of speech in the development of the child's ability to discriminate objects and qualities of objects around him. There must be a vague sort of perception before ideas are learned, before speech develops. But in the children who talk to us or draw for us perception is probably always partly ideational. At the same time that the child's ability effec-

tively to interpret present objects is increasing, he is also learning more and more effectively to think about these objects, that is, to make adaptive responses with reference to them, in their absence. In other words, the child soon learns to increase his knowledge of objects, his potential ability to react to them correctly, by attaching new meaning responses to symbols which stand for the absent objects. These symbols considered in reference to the objects or situations for which they stand we call ideas. The possibilities of learning and adjustment are increased in proportion to the ability of the child thus to deal indirectly with the objective world.

Ideas of Memory and Imagination.—When the ideas which are utilized in this indirect adjustment simply represent past events, they are called memory ideas. For example, a child wishes to go out to play but his coat can not be found. His mother says, "Think where you left it," and as he reviews one by one in his thought the places where he has been, he suddenly remembers the coat lying on the table in the basement. The ability to reinstate this past experience in symbolic terms makes possible more effective adjustment in the present situation.

Sometimes, however, adjustment to a future situation is demanded. Thus, the boy is going to camp this summer for the first time: what clothing shall he take? Having felt the cold of an evening in the woods, and been stung by mosquitoes near the lake, the boy is able to imagine what some features of camp life will be like; and the occurrence together in thought of ideas from the past, with reference to a future situation, makes possible anticipatory adjustment to that situation.

Imagination may, however, deal also with past or with absent present situations. Thus, a child in thinking of past experiences may add others which did not really happen for the sake of the pleasure it gives him or someone else. An eastern boy who has traveled through Oklahoma, and has been disappointed at the absence of wild Indians and stage coaches, may summon up all sorts of ideas about these interesting things, and may even yield to the temptation to include them in the account of his trip which he gives to playmates. A child may also in his thinking supplement what he has heard of a distant place or person, so that he has an "idea" of that

place or person which, though it does not at all correspond to the objective situation, has the color of reality to him.

A child in his imaginings can only utilize, of course, data from his own experience. These may be related in various ways, and the synthesis is new or created, but only in the sense that this particular pattern of thought has never occurred before. Imagination does create significantly new ideas, but they are the product of previous experiences.

Imaginal ideas help in organizing the child's thinking about distant places, and in reconstructing the past from the study of which he can learn very useful lessons. As human beings have become more civilized, the world as they conceive it has greatly extended its boundaries, both in space and in time. Little children, under the influence of suggestions and questions from adults, will naturally also feel the desire to know this interesting world. And a preliminary acquaintance, gained through imagination, is a valuable start in that fuller knowledge which, in favorable circumstances, they will in time achieve.

The ideas of memory and imagination which add so greatly to the richness and meaning of the child's world are acquired only gradually, of course, as his experience widens. At first they are scanty, inaccurate, and confused. Ideas of memory and those of imagination have the same subjective characteristics—they may be represented by the same words or images, and call out the same responses. They differ only in objective reference: the first can be, theoretically, verified, the others do not correspond to actual experiences. Hence we should expect, in the very little child, constant confusion between the two, and this confusion is, in fact, a very prominent feature of the thought of the child.

A little boy known to the writer, when asked what he had done that day, said, "Paul fly way up sky — way up." Here we have the idea of flying, originally, probably, suggested as a definite idea. Seeing a flying horse in the movies, a child may for a time actually believe that horses fly, his experience not having been such that the word horse arouses conflicting meaning responses. There is much inaccuracy of report in very young children because of this natural mingling of the actual and the imagined. The earliest memories of one's childhood are especially likely to be unreliable — stories told

by others, experiences desired but not had, may be conscientiously thought of as having actually been experienced.

Experimental studies of memory in young children have brought to light some of the factors underlying the greater inaccuracy of memory and report in children as compared with adults. For one thing, as shown in the chapter on the growth of abilities, it has been established by experimentation that capacity for remembering events experienced, even simple ones, such as a heard series of digits, is much lower in young children than in adults, and increases only gradually up to mental maturity, after which point it remains fairly constant until senile changes set in. The events of the first three years or so are, of course, not remembered at all. The Freudians explain this by assuming that the ideas of the child about these early experiences are painful because of shame owing to social disapproval of his naughtiness, that they are pushed into the unconscious, or repressed, only to bob up and cause trouble later.¹⁷ Parents known to the author certainly do not infuse shame into their really happy children, but the children forget just as do those of the unenlightened! An explanation of forgetting in terms of the immaturity of the nervous system and the scantiness of the language equipment of the young child, and of the retention of emotional experiences in terms largely of conditioning, seems much more reasonable.

Considering the relatively limited memory capacity of young children even for simple objects such as colors and geometrical figures, it is not surprising that experiments on observation and report of complex scenes should reveal great inaccuracy. Stern developed special methods for testing accuracy of observation and report in both adults and children, and the experimental studies which he and his students made seemed so promising that in 1903 he founded a magazine for publishing articles on the "Psychology of Testimony" (*Aussage*).¹⁸ For children the chief method consists in presenting a standard colored picture ("The Peasant's Room" was most commonly used) for a certain length of time, usually about one minute, and then requiring the child to tell what is in the

¹⁷ Anna Freud, *Psychoanalysis for Parents and Teachers*, Emerson, 1935

¹⁸ W. Stern (editor), *Beiträge zur Psychologie der Aussage*, Barth, 1904, 1905, 1906.

picture. The narrative report is supplemented by a careful set of questions planned in advance. The results of the many long and intricate German studies of "testimony" in children, made by Stern, Lobsien, Lippman, Borst, Oppenheim, and others are well summed up by Colvin:

The chief single result of the psychology of testimony is that an errorless report is not the rule, but the exception, even when the report is made by a competent observer under favorable conditions. Errorless reports are commonly characterized by a very small range, *i.e.*, they are the reports of individuals who are extremely cautious and who state only what they are certain of. . .

The reports of children are uniformly inferior to those of adults. The extent covered is not great, the errors are numerous, but at the same time the *certainty is marked*. Between the ages of seven and 18 the extent of the report increases rapidly. Although the accuracy increases at the same time, it does not grow with such rapidity as does the range. . .

Very young children enumerate only isolated objects or persons. A little later, about the eighth year, they report actions more carefully; but they first pay attention to relationships, spatial, temporal, and causal, at about the tenth year. Later still, there appears the capacity to describe the qualities of the objects concerning which they make their report. . .

The introduction of suggestive or leading questions very noticeably decreases the accuracy of the report for children, and to a certain extent for adults. . .

The simple practice of reporting, even without special training or conscious effort to improve, facilitates better reports. There is improvement in range and accuracy and in the assurance of the reporter that is warranted by the facts. Similar practice effects may be observed in the increased accuracy of replies to questions. The capacity of children to observe and report in a detailed and accurate manner may be improved by systematic training.¹⁹

Some of the German experiments on school children were repeated in England by Winch, whose findings were in general the same. Winch also conducted interesting experiments to see if by special training he could secure improvement in the ability to observe and recall correctly details of a scene. Results here, as in the German experiments, were positive.²⁰

Doubtless ordinary observation and report in children is in most cases at least as unreliable as in these experiments. In-

¹⁹ S. S. Colvin, *The Learning Process*, Macmillan, 1917. Reprinted by permission.

²⁰ W. H. Winch, *Children's Perceptions*, Warwick and York, 1914, also "Can Observation Be Trained in School Children?" *Jour. Educ. Res.*, 15: 229-238; 314-326.

deed one would expect less reliability since observations are often made in the most casual and fleeting manner. Hence even from the most intelligent and sincere observers inaccuracy is to be expected, especially from the youngest children, but in a greater or less degree from children of every age, and also from adults.

The studies made indicate that very little if any of this inaccuracy is to be attributed to intentional falsifying. Parents often err in believing their children have lied to them, just as they frequently err in accepting their stories of events as representing what actually took place. Among the reasons for inaccuracy in report are natural errors in the original perception of the scene or event, confusion between imaginal and memory ideas that are aroused during recall, overconfidence on the part of the child, the tendency to be influenced by suggestive questions from adults, and the existence of a meager stock of related ideas to serve as cues for recall. Overconfidence on the part of the child in his own reports is one of the most important factors. There is no reason why the little child should distrust his own observations, unless something happens to show him his error. That something will naturally be a reminder or demonstration by an adult, and even then a critical sense may develop but slowly. The *Aussage* experiments as well as some of Piaget, to be discussed later, furnish objective evidence that children are extremely uncritical. Their "assurance," or statement of belief in the truth of what they report, very often is complete.

The tendency to be influenced by suggestive questions from adults is not hard to understand. Children from the first are accustomed to having adults answer their questions, tell them what is good or bad, and what they may or may not do. Why then as young children should they resist a suggestion made by an adult? Unless the adult suggests that the matter is a doubtful one, the child may be expected to believe in the truth of the first statement that occurs to him. It must be remembered that there are no reliable subjective criteria which enable the child to distinguish between fact and fancy.

Conceptual Ideas.—A concept is an idea in which the symbol, instead of standing for a specific absent object, stands for any one of a large number of objects, or for certain types

of arrangement and relationship among objects. The symbol is capable of eliciting as its meanings the thought of certain features possessed in common by these classes of objects or by these situations. For example, the word "dog" has the meanings four-footed, alive, barking, and so on. The word "animal" means being alive, moving about freely, and having blood.

Concepts develop along with percepts in connection with continued trial-and-error experiences in reacting to objects. The child at first attaches the word dog to all stimulus patterns of a certain type. A two-year-old who has learned to apply the term "doggie" to a cloth dog and a fur dog, and to various pictures of dogs in books, is heard to say "nice doggie" on seeing a picture of a zebra, or on catching sight of a squirrel in the yard. Gradually, guided by elders, he learns to say "doggie" only when certain features are present, and to react appropriately. He ceases to try to pet squirrels, and is not heard to exclaim "bow-wow" on seeing a cat. The development of the ability to make such discriminating reactions is, as Dashiell has said, "one of the cornerstones in the building of man's intellectual achievements. It is the very basis of rational behavior."²¹

The child learns to make finer and more accurate discriminations in proportion to the richness of his experience. In the case of classes of objects with which he has had a great deal of experience, let us say with electrical toys, a given child gradually learns the names of and the appropriate reactions to very fine details. A boy of ten known to the writer had gained such expertness through the handling of electrical toys that he knew just what to do if something ceased to work, and was called in by his mother to repair household apparatus.

This discriminating ability must, at the very first, function on a sensory-motor level, but when the child learns to apply names to the different parts (or learns other symbolic responses), the foundation is laid for thinking about them. Soon in the absence of the object the name of the object, merely thought of, will arouse symbolic responses standing for its various features. Thus the word "dog" may elicit the

²¹ J. F. Dashiell, *Fundamentals of Objective Psychology*, Houghton Mifflin, 1928, p. 495

thoughts four-footed, barking, and the like, according to the richness of the child's experience with dogs. Such an idea is a concept.

Dashiell pointed out that the term "insight" as used popularly and by some psychologists, is really a name for the keenness of discrimination which involves ability to respond to some special aspect of a situation, some particular stimulus or stimulus pattern, and he emphasizes the dependence of insight on experience with the type of situation being dealt with. The small boy spoken of above had keen insight into matters electrical, but he did not know when his brother, who played the violin, was off key. A certain high school girl can see at once what shade of ribbon is needed to match a sample; but she is overwhelmed by the intricacies of a railroad time-table, which she "simply can't make out." Although native aptitudes undoubtedly play some part in determining insight into such situations, to the psychologist the preponderating influence of training, and rather specific training, is clear.

Insight may consist in making correct responses to some detail of a present situation, and hence may consist of behavior which, although intelligent in a high degree, is not ideational. Or, if the responses are symbolic, and if the qualities or aspects of the situation are dealt with or compared in relation to the thought of the situation instead of the objective situation itself, then we say that the subject is thinking about the situation, is employing concepts, or even that he is reasoning. In many cases the observer is unable to say on what level of insight the solution of a given problem is taking place, as will be shown a little later in discussing the behavior of apes and children in obtaining objects by indirect means.

Really accurate concepts, that is, abstract ideas which are capable of calling out in the child symbolic responses standing for the common features of the class denoted, and those features only, are very slow in developing: they do not appear until the later years of childhood. This slowness is not for the most part due, apparently, to lack of ability to handle abstract concepts on the part of the younger children, but to the overwhelming number and complexity of the situations which have to be mastered, and to the irregular and interrupted character of the learning.

In the development of a concept we may point out two factors, the first of which is the process of learning to react in the same way, usually by naming, to the common elements in a large number of situations which differ in some respects. This is called the process of *abstraction*, and it is a necessary basis for *generalization*, the second factor, which involves the conscious association of these features with some common symbol which may later be applied to other objects: "This animal has four legs, a thick tail, and stripes. It is a zebra." Although it takes a long time under the conditions of daily life to build up abstract ideas, when the conditions are simplified as they are in certain experiments, or in daily life in which there is special teaching, then even very young children may master fairly complex general ideas.

Experiments by Sander and Heisz with children's building blocks illustrate in natural situations the difficulty of abstraction for younger children. In this experiment a structure was made of building blocks (*Bauklötzen*) all of one color but of different shapes. One block was missing. The child was required to find the missing block either in an irregular collection of other blocks, or in a collection arranged to form a pattern. As one would expect, it proved more difficult to find the missing block in the pattern than in the scattered group. In the former a higher degree of abstraction is involved, that is, a complex existent pattern must be disregarded in reacting to a stimulus which was part of another situation. The ability to find the block, as measured in time required, increased sharply from the fourth year to maturity.²² (See curves, Fig. 33.)

In daily life the process of abstraction is of course neither controlled nor understood by the child. It simply happens that in his repeated experiences with objects some reactions are checked and others are not, so that a "name" comes to be evoked by certain objects and not by others. The baby hears the word "sugar" applied over and over again in special situations and learns to say the word in response to any situation which has the same general features, that is, which provides the same stimulus-pattern. But when he applies the name or reacts overtly to a situation differing in important respects

²² See report in Volkelt, *Fortschritte der experimentellen Kinderpsychologie*, Jena, 1926, 49-51

from the correct pattern, the consequences are likely to force him to change his response. For example, suppose the child, seeing snow on the ground, calls it "sugar" and takes some in his hand to eat. The resultant cold and wetness arouse new responses such as he has not made before in a similar situation. If an adult is near he may learn then and there two new words, "cold" and "melt"; but in any case the tendency to apply the word "sugar" and to eat it is checked.

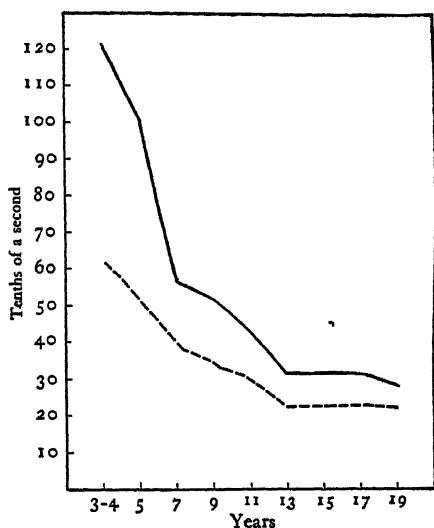


FIG. 33. DEVELOPMENT WITH AGE OF ABSTRACTION UNBROKEN LINE SHOWS TIME REQUIRED TO FIND THE BLOCK IN A PATTERN, DOTTED LINE, IN A SCATTERED GROUP

From Hans Volkelt, *Fortschritte der experimentellen Kinderpsychologie*, p. 52. (Copyright by Gustav Fischer, Jena, 1926. Used by permission.)

After sufficient experience in reacting to varied aspects of such situations, the child says "sugar" and thinks of eating and other appropriate responses only when certain conditions are present. When he has reached that stage the child is in a position not only to perform appropriate responses, verbal and otherwise, on the proper occasion, but also to think of the essential characteristics of a class of objects when he is not confronted by any particular object. In other words, he has

acquired a generalization, an idea which stands for a particular system of responses, and which can be applied correctly to actual situations as they come up.

The development of concepts presents the same general features that perceptual development does. In the next chapter, which deals with the organization of meanings in thinking, we shall see how the juxtaposition and syncretism which are both features of early concepts gradually give way to the analysis and synthesis which are necessary for logical thought. At this point we may merely call attention to some of the factors which are important in the development of serviceable general ideas about the world.

We should not expect that in all children the growth of ideas would show the same progress toward accuracy, richness, and maturity. Naturally the development of meanings, ideational as well as perceptual, would be related not only to age but also to such factors as native intelligence and social status, and especially to the stage of cultural development attained by the society in which the child grows up. We should expect that in general a child's ideas would be developed and enriched only to the limit of the experience of the adults surrounding him. Ideas of natural objects and forces, of the nature of other human beings, of number, space, and time, will gradually become more numerous and richer in quality with experience and teaching, and will finally be narrow or broad, crude or refined, in rough proportion to the experience of the adult social group in which the child lives. A boy brought up in a primitive Indian community would have much cruder ideas than one of equal native intelligence brought up in a typical American town. All races presumably had at one time a very limited stock of ideas, just as each individual child has now. New words and new ideas were gradually acquired in the course of many generations of experience, in much the same way in which the child acquires new words and ideas in his own race or group. Thus ideas are meager in the early stages of development, both in the individual and in the race, and become rich and accurate in rough proportion to the amount of individual and racial experience.

SUGGESTIONS FOR READING

When taking up the study of perception the student who is not familiar with the essentials of *gestalt* doctrine has his best opportunity to gain such familiarity, for it is in this field that the *gestalt* psychologists have done the most work, and their best work. Koffka's *Growth of the Mind* is a child psychology but emphasizes general theory. George W. Hartmann's *Gestalt Psychology* is a sympathetic but not partisan book dealing with the history and contemporary status of the movement. . . . The best material on children's perceptions is to be found in articles in periodicals, or in chapters in standard texts. . . . Hall's original article on "The Contents of Children's Minds on Entering School" with its revelation of the meagerness of the contents, is good reading today, as are its modern descendants. . . . Meltzer's *Social Concepts of Children* is one of the studies which indicate a crudeness of social thought that is shocking to some adults. . . . In the author's opinion Piaget's *The Child's Conception of the World* is the most stimulating book on the growth of meanings which we have.

CHAPTER XII

THE ORGANIZATION OF MEANINGS IN REFLECTIVE THOUGHT AND REASONING

FOR THE SAKE of a clearer understanding we have traced separately the development of special types of meaning, but there has been no assumption, of course, that either perceptual or ideational meanings ever function in isolation. They are part of a totality of adaptive behavior in which, as the child grows older, symbolic activity becomes increasingly prominent and important. In this chapter we shall deal with the development of symbolic activity, or thinking, as distinguished from other modes of adaptive behavior.

We may conveniently distinguish several varieties of thinking. To one type we shall apply John Dewey's designation, "chance and idle thought." This includes all the fancies, trivial and otherwise, which are likely to intrude themselves when we are not engaged in working out a definite problem — and sometimes when we are. It is illustrated by Mark Twain's fancy about the conductor — "Punch, punch, punch with care! Punch in the presence of the passenger!" But little of our idle thought is so distinguished by rhyme and rhythm. This casual and irrelevant thinking one is tempted to call childish, yet it bulks larger in the total thought of the average adult than one might suppose, and is present in the wisest of men.

Dewey in 1910 placed daydreaming in the class of chance and idle thought,¹ but that was before the Freudians had called general attention to the significant ways in which this kind of thinking may be ordered. It now seems logical to place daydreaming, along with nightdreaming and some of the "undirected" thought of the insane and of the little child, in a separate category, perhaps giving it the Freudian name of autistic thinking. This is an egoistic type of thought adapted to the needs of the thinker but not directed by the need for communication or other social considerations. It

¹ John Dewey, *How We Think*, Heath, 1910; new ed., 1933.

will receive some treatment in this chapter and also in later chapters.

Thought which is more or less faithful reproduction of past experience we may call recollection. To this we have already, in the preceding chapter, given some consideration.

A fourth variety of symbolic behavior, which we may call reflective thought, will be the chief subject of the present chapter. This is thought which originates in what Dewey calls a state of perplexity, hesitation, or doubt — in other words, in a problematic situation — and which involves the occurrence of suggestions, one of which finally puts an end to the hesitation or resolves the doubt. The suggestions may be applied as soon as they occur, or may be retained as beliefs, without any orderly search for the best solution or any comparing or testing. Or there may be a persistent and systematic search, involving the most careful effort to test the validity of the suggestions which occur as solutions of the problem.

The work of testing and proving hypotheses is called reasoning by Dewey and by Piaget. Some psychologists would use the word reasoning in a less restricted sense, as applying to any problem-solving which involves ideas, whether or not it culminates in the process of comparing and testing hypotheses. After we have made an analysis of reflective thinking as it actually goes on in children we may more easily decide whether it seems preferable to use the word reasoning in the more restricted or in the broader sense.

OBSTACLES TO THE UNDERSTANDING OF CHILDREN'S REFLECTIVE THOUGHT

The investigation of reflective thought in children entails special difficulties. In the first place, we are prejudiced by adult ways of thinking which have become second nature to us, and prevent us from clearly understanding the ways of childish thought. Our very language, acquired uncritically and representing a systematization of racial experience, inevitably directs our thought in certain channels, makes certain conceptions seem so natural to us that it is sometimes almost impossible to form new ones on other bases. The words *mind* and *body*, implying a dualistic view, illustrate this point. But the child, starting afresh, has very different modes of

thought at first, and an adult who would understand them must do his best to free himself from his peculiarly adult points of view, and try to put himself in the place of the child. This is not an easy undertaking.

A second reason for the difficulty in studying children's thinking is that there is no way of getting a clear first-hand account of it. The thought of little children is spontaneous, vague, full of implicit assumptions which they have never formulated because there has never been any occasion for formulating them. Hence in order to understand it the psychologist must find some indirect means of determining its characteristics. He may observe the child's spontaneous talk and action, and deduce from them the nature of the guiding habits and concepts. But this method will only slowly yield significant results. He may rely upon questions and conversations, but if he does he must remember that his remarks and questions destroy the naïveté of the thought and are likely to influence its form and course, so that the questioner must try to infer from the very first replies of the child what the underlying ideas or beliefs are. The work of questioning the child in this way, with a minimum of suggestion, requires training, skill, and patience, a thorough acquaintance with children, and a good deal of tact and delicacy of perception, as well as a knowledge of the technical points at issue.

In spite of the handicap of an adult point of view and the fact that children's thought is inchoate and not directly communicable, the psychologist may consider it a most important undertaking to try to determine its nature. The chief reason is that such a study may throw a good deal of light on the characteristics of adult thought. When we see something of the origin and the process of growth of our chief ways of thinking, we may be able better to judge their value. It may be that we shall recognize in some adult thinking survivals of a childish stage which should, in the interest of effective adaptation, have been outgrown. Or again we might be forced to the conclusion that in some respects adult thought has developed too far, so to speak, has become too crystallized and formal. But in any case a genetic study of reflective thought is bound to increase our understanding both of its limitations and its advantages.

Because of the difficulties inherent in this subject relatively

little progress has thus far been made. Such men as Sully, Baldwin, Claparède, and John Dewey have observed keenly and have contributed stimulating and brilliant theories, but even their work has been affected by the almost inevitable "adultism." G. Stanley Hall and others have studied concepts and reasoning in large numbers of children; but their investigations have not been successful in overcoming the difficulties which we pointed out above. Scattered material of great interest has been contributed in various reports on individual children, some of which have been referred to in the preceding chapter, and by workers in the field of mental testing. But only in recent years have we had systematic investigations of children's thought which have succeeded, as it were, in getting beneath the surface.

The great advance in this respect has been made in Switzerland by Jean Piaget, to whose work we have already made reference. Recognizing the necessity of systematic first-hand observations and experiment, he has worked out very careful methods, and with the help of a number of collaborators has already produced some critically interpreted factual studies which are of the first importance. Our discussion of the chief features of childish thought will be based largely upon Piaget's work and will involve reference to some of his experiments and their results, but this treatment will give little idea of their extent and suggestiveness. The reader should by all means examine some of the original studies.

THE PRINCIPAL FEATURES OF REFLECTIVE THINKING IN THE CHILD

Egocentrism. — At first children's thinking, like their other activity, is a sort of spontaneous play, answering to their own needs and impulses, but not under any necessity of conforming to "reality" or satisfying other people. In other words it is strikingly egocentric. Piaget has gathered two main types of evidence for this generalization.² One was gained through the study of children's spontaneous speech when with companions. Little children talk a good deal, and their remarks furnish a good index of their thinking. At the

² Jean Piaget, *The Language and Thought of the Child*, Harcourt Brace (new edition), 1932.

Maison des Petits (school for young children) connected with the Rousseau Institute in Geneva, Piaget and his associates recorded the entire speech of a number of children over a period of about one month each, during periods in which the children were free to do as they pleased.

A prominent form of speech distinguished in this study was the "collective monologue" or pseudo-conversation in which a child, though apparently addressing himself to another child or children, in reality is talking to himself. He asks questions, but goes on without waiting for an answer. Although he may pause while another child is speaking, he afterward goes right on with his own train of thought, uninfluenced by what the other child has said. Piaget calculated for each child the proportion of egocentric remarks, including collective monologue, to the total number of remarks made by the child in the period of observation, and thus arrived at a rough mathematical statement of the egocentricity of the child's speech, a number which he called the coefficient of egocentrism. For children between the ages of three and five this was found to be between .54 and .60; and, Piaget suggests, were there any way to measure the thoughts which the child keeps to himself, the proportion of egocentric thoughts would certainly be larger. For the children between five and seven the coefficient was lower — about .45. For two boys aged seven it was .30 and .27 respectively.³

Other psychologists have confirmed Piaget's finding about the egocentricity of childish speech, though percentages differ. McCarthy⁴ found a much smaller per cent but her method did not involve observation in free play or work situations with other children as did Piaget's. Instead she herself presented material (pictures and toys) to each child and recorded 50 responses. This would encourage social responses to the grown-up. The sample of speech, moreover, was small. Dr. Mary Fisher, studying 75 children aged 22

³ Jean Piaget, *Judgment and Reasoning in the Child*, Harcourt Brace, 1928, p. 257. When citing concrete material from Piaget in this chapter we shall follow after this his custom of referring to the chief studies cited by initials with number of page in parentheses. J. R. stands for *Judgment and Reasoning in the Child*; L. T. for *Language and Thought of the Child*; C. C. for *The Child's Conception of the World*, Harcourt Brace, 1929.

⁴ Dorothea McCarthy, *Language Development of the Preschool Child*, Univ. of Minn. Press, 1930.

to 60 months, obtained stenographic records covering the entire speech of each child over a total period of nine hours, in both free play and standardized situations (responses elicited). Her results strikingly substantiate Piaget's, for when the data are treated to correspond with his method an average coefficient of egocentricity of .53 was found for the entire group of children; and this coefficient was practically the same at every age through five years.⁵

The objection might be made that speech is not necessarily an exact reflection of thought. This is, of course, true. But speech is certainly very closely related to thought, and is the one means by which we may gain knowledge of the thought of another. Besides, in his emphasis upon egocentricity Piaget has simply put into words and adequately "documented" what those who have watched babies grow up have recognized and commented upon for a long time. These researches of Piaget are abundantly confirmed by ordinary observation, and are seen to be entirely in accord with what we know about the development of perception and indeed, as later chapters will show, of personality in general. ' Egocentrism is inevitable in early childhood. But in thus calling our attention to its importance in thinking, Piaget has made a fruitful contribution, especially as he shows that the other chief features of child thought are intrinsically related to this egocentrism.

Relative Lack of Logical Consistency. — Young children often make remarks or engage in conversations which suggest that they realize pretty well the bearings of what they are saying. But Piaget presents extended studies of children's concepts and definitions, and their behavior in solving problems, to show that as a rule, in younger children, this impression of logical consistency which we get does not truly represent the facts. The children are not conscious of the grounds of their thinking, and cannot give a logical account of it.⁶ It is pointed out that although young children can do a certain amount of effective thinking (correctly solve some arithmetical problems, for instance) their procedure is not systematic, but their thought tends to go on in a series of fumbling attempts until finally they hit upon the right an-

⁵ M. S. Fisher, *Language Patterns of Preschool Children*, Teachers College, Columbia Univ., 1934, Child Develop. Monogr. No. 15.

⁶ Jean Piaget, *Judgment and Reasoning in the Child*, chapters 1, 4, and 5.

swer. Often they are sure it is right, but they are unable to recall just how they got their answer, or to make clear why it is right. To illustrate from a problem given to a seven-year-old boy: "This table is 4 meters long. This one three times as long. How many meters long is it? *Twelve meters*. How did you know that? *I added 2 and 2 and 2 and always 2*. Why? *So as to make 12*. Why did you take 2? *So as not to take another number*" (J.R. 139). Occasionally Piaget supplied matches for the problems, and the children would fumble with them, sometimes solving the problem entirely by manual procedure, sometimes handling the matches only part of the time, and sometimes doing the fumbling entirely "in their heads."

Other illustrations of the "lack of conscious realization" in young children are taken from an investigation of their concepts and definitions. The definition of objects in terms of use, of which we have spoken in an earlier chapter — "A fork is to eat with" — shows a lack of awareness of the logical meaning of the term. It is after the age of about eight that children in general begin to show awareness of classes and, finally, of general characteristics. We may illustrate again by reference to the concept of life. A child was given the name of a familiar object, and was asked, "Is it alive?" and then after the reply, "Why is it (or is it not) alive?" The children's answers showed that these names evoked fairly consistent meanings. For example, one child's answers would show that he considered anything alive that moved *of itself*. But he could not express this condition. A seven-year-old child may clearly believe that the sun is alive, but deny life to a boat and a motor car. Yet he is greatly perplexed when asked to explain why the latter are not alive. His conception is implicit (in the ordinary meaning of the term), but the child is not aware of it; that is, he has never formulated in words the essential meanings of the objects he is thinking about (J.R. 146-169).

On the basis of this analysis Piaget concludes that the reasoning of the young child before seven or eight is a mental experiment, consisting of a series of discontinuous judgments which follow one another like overt movements, so that the child is not aware of the relation between them. The reason for this "unconsciousness," Piaget says, lies in the egocen-

trism of childish thought. Since the child is reasoning only for himself, there is no need to be aware of the mechanism; his attention is turned toward the external world, toward, we may say, the results of his thinking, not the process itself. His thought remains "unconscious" because it is sufficient for the purposes of action. It is when other people begin to ask questions, to interrupt, to express doubt as to the results obtained, that the child begins to "realize his thought." The question asked in Piaget's studies, for example, constituted social stimuli of this sort.

Now it is an important fact, Piaget says, that when because of social pressure the child is forced to carry on trains of thought on an entirely verbal plane, in circumstances which do not permit the manipulation of objects, difficulties appear which have already been conquered on the plane of action. For example, if a child of about seven is shown three colors of differing degrees of brightness, he can see that one of them is both darker than one and lighter than the other; but years later he has great difficulty in solving a problem like this: "Edith is fairer than Suzanne; Edith is darker than Lili. Which is the darkest of the three, Edith, Suzanne, or Lili?" Not until the age of 11 could most of the Geneva children answer correctly. The social requirement of carrying out the operation entirely by thinking creates a new problem, and the child has to learn all over again how to adapt himself.

In general, Piaget would, it seems, consider the period before the years seven to eight as the period of which this "empirical" mode of thinking is most characteristic, and during which the mental experiment is likely to be carried on by means of *partly* manual fumbling or in the presence of the objects thought about. Between the ages of eight and eleven or twelve the child learns how to manipulate verbal meanings as he once manipulated objects, and is becoming ever more "conscious of his mental operations."

In a study in this country of 2000 school children aged eight to nineteen years Noffsinger and Loutitt found among children eight to ten a good deal of self-reference in the task of picking out the correct word meanings for a given word. A list of words was given, each one followed by several words. The child was to underline the two words among these which the first word is *never without*. An example is:

TREE — apples, *branches*, acorns, *roots*, flowers. Except in the case of the common words cat and tree, the essential words were not selected by 100 percent of the children even at the highest age.⁷ The children were familiar with all these words and could of course deal with the related practical situations; but there was difficulty in dealing with them on a logical plane.

The author believes there is abundant evidence, aside from Piaget's work, that the ability to analyze one's own thought, to reason *systematically*, develops only gradually during childhood. But she would not use Piaget's terminology. Where Piaget says "unconscious," she would say simply "unanalyzed." She would also disagree with him in so far as he implies that the trial-and-error mode of attack on a problem, with a lack of realization of the logical processes involved, is characteristic of early childhood only. To be sure he states in various parts of his books that children go through these stages of thought irregularly and at different rates, and that in some adults thought is still egocentric; but one gets the distinct impression that he believes normal development involves outgrowing of these early empirical trial-and-error methods of thinking, and that by the age of about twelve they are no longer characteristic. Later on in this chapter we shall present reasons for considering that all thinking, all reasoning ever, is trial-and-error in character.

Difficulty in Understanding Relationships.—The fact that the thinking of the young child is egocentric is related to his early inability to see things from any other point of view than his own. The child is the center of his own universe, the point of reference for every judgment, and it is with difficulty that he learns to think of objects in relation to other people or to each other. Childish errors in talking of relationships, as for example of members of a family, are familiar to all who know children, but the extent and significance of this "inability to handle relations" has not been sufficiently recognized. The Geneva investigators have gathered a mass of interesting evidence on this point, from which we shall cite only a few illustrations.⁸

⁷ F. R. Noffsinger and C. M. Loutitt, "The Development of Logical Selection in Word Meaning among School Children," *Child Develop.*, 1932, 3: 317-323.

⁸ Jean Piaget, *Judgment and Reasoning in the Child*, chapters 2, 3 and 5.

A boy of seven and a half named Jacq is asked, "Have you any brothers? *Two* (Paul and Albert). Has Paul any brothers? *No*. You are his brother? *Yes*. Then Paul has some brothers. *No*." An explanation is given and apparently understood. But this conversation occurs an hour later: "Has Albert any brothers? *One* (Paul). And Paul? *One* (Albert). And your sister? *Two*" (J.R. 84-85).

Other tests were designed to see how the children understood the relation of right and left. At the age of five three-fourths of the Geneva children named correctly their right and left hands. But the fact that these words were absolute designations of a particular limb, involving no awareness of the logical relations, is shown by their replies when asked to name the right and left hands of a person standing opposite them. This nearly three-fourths of the children were unable to do. Children in the Preschool Play Group of Smith College given the same tests under the author's direction, replied as did the Swiss children. It is true that adults often hesitate before they make such judgments correctly, but they are able to deal with the situation, as children *at first* are not.

Absolutism.—One aspect of this inability to understand the relativity of ordinary terms is seen to be an absolutistic view of the world. Things are as the child sees them. Boys of Geneva until seven or eight years of age believed that the moon followed them on their walks. Wood floats upon water because it is light in the absolute sense, and not because it is lighter than water. An enemy is a person with certain disagreeable characteristics, and the young child is for a long time unable really to understand that he who is an enemy of one person may be a friend of someone else. A part or fraction of an object is thought of as something in itself.

The point made by Piaget about parts of a whole is well illustrated in children's drawings of people. One little girl between the ages of three and five made many drawings of people, talking to herself as she worked: "Now I'm making the head. Now I'm making the hand," and the like. At three years she began to put in "foreheads" and soon was including "palms" and "shoulders." These she always added separately, as distinct areas. She could not see that she had made a forehead when she had drawn the head! These absolutistic touches in drawings are illustrated in Figure 34.

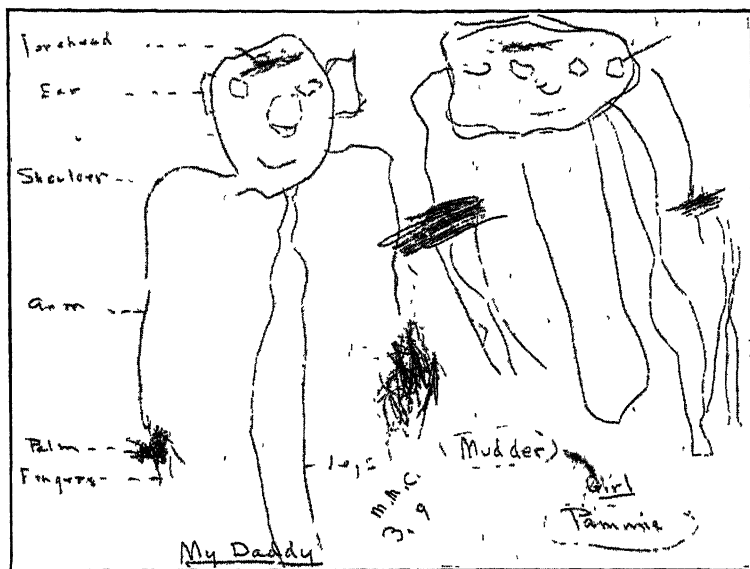


FIG. 34 ABSOLUTISM ILLUSTRATED IN DRAWING BY A CHILD
AGE 3 YEARS, 9 MONTHS

After five this child no longer added these areas — she was becoming intellectually sophisticated.

Places, to the young child, have an absolute location. The writer remembers being greatly puzzled, as a little child, on hearing that some neighbors while visiting in Iowa had stayed in Des Moines. These two names stood for absolutely independent entities to her. Piaget found much confusion on this score among Swiss children. A similar realistic and absolutistic tendency is illustrated in children's difficulties with boundary lines, which they often expect to see as black lines laid out on the earth. One consequence of egocentrism is thus a naïve realism in which the child's point of view determines his whole perception and thought.

It is not difficult to see that these pervasive childhood habits of judging things from the one point of view, of interpreting the world in a realistic and absolutistic way, may persist into adult life. We have seen that logical difficulties which have been overcome in dealing with concrete objects reappear when the material is more abstract; and this sug-

gests that those who have passed beyond the absolutistic stage in thinking about boundary lines and the motion of the sun may still be in that stage as far as other things are concerned. In psychology this may be illustrated, perhaps, by the persistent tendency to think of meaning as an entity of some sort, and to think of the mind as an immaterial substance instead of a certain relationship among phenomena. Probably the greatest advances in science within the present century have come from the broader extension of the concept of relativity, the ability of human beings increasingly to think in terms of objective relationships instead of reasoning from the self outward. Thus the consideration of the difficulty of handling relations in childhood throws light on reasons for ineffectiveness in adult thinking.

Juxtaposition.—The same egocentricity which keeps the young child from appreciating objective relationships results in a great deal of disconnectedness in his thinking. Statements are made in succession, but not related or contrasted. They are simply juxtaposed. This is the case when the Geneva child of eight says that he is a Genèvean, but denies that he is a Swiss, although he states correctly that Geneva is in Switzerland. Shown a drawing of a circle representing Geneva, and asked to make another to show Switzerland, he draws another circle beside the first (J.R. 122).

Juxtaposition as a result of failure adequately to conceive of relations between objects and events independently of the self is well illustrated by the manner in which the child deals with what to us are causal sequences. In his narrative he is likely to mention events in illogical order, connecting his statements simply by "and" or "and then"; and if "because" is used it is not in such a way as to show any clear appreciation of physical causality. When Piaget gave children sentences to complete containing the word "because," they responded very often with incorrect uses of the word, often completely inverting the relationship, as in this completion by a child of seven — "That man fell off his bicycle because he was ill afterward" (J.R. 19).

The author believes that Piaget, in his study of the use of the one word "because" by children, has assumed a closer correspondence between thought and speech than in this case

exists. "Because" is one of those abstract words which may be used imitatively by children long before they have any conception of its logical meaning ; and children may have the concept and be able to deal with it reasonably in some situations *before they can use the word* correctly.

But whether or not we accept Piaget's special interpretation of children's use of "because," we must grant that different parts of an explanation are often given by children in a sequence which to adults seems illogical and disconnected. We do find the same sort of juxtaposition in their complex narratives that we observed in the preceding chapter in their drawings and their definitions.

Syncretism. — In reflective thinking as well as in perception juxtaposition is related to syncretism. The deficiency of logical order and lack of appreciation of objective relationships does not mean that there are not "subjective unities" in the child's thought. Piaget suggests, in fact, that in the first thought of the child there is nothing but connectedness — everything is connected with everything else, not in a logical way, but because things simply are given together, belong together. This is true because of the child's egocentrism, which makes him assimilate all his experience to his own point of view, interpret it according to subjective schemas of his own. It is when the child is forced to react to changed external conditions, or to the questions and commands of other people, that this primitive unanalyzed whole of experience is broken up ; and the very disconnectedness of the parts which the child thus deals with in relative isolation is perhaps a consequence of the exaggerated intimacy of the subjective unity which had prevailed. Naturally this original subjective unity is only postulated by Piaget — by the time the child is old enough it has been much broken up by the "exigencies of experience," and the thinking of the child as we know it exhibits both juxtaposition, which we may call objective disconnectedness, and syncretism, which we may call subjective schematism.

Common observation indicates that to the child events which occur at the same time obviously belong together. The child often seems amazed that any question should be asked, and sometimes just repeats the statement, satisfied with the answer. "Why does your daddy go to the office?" is an-

swered by, "He goes there every day." Or the child may say, "Because he does," or simply "Just because!" which is a common reason given by little children, and evidently seems quite sufficient to them. In the Geneva investigations children invoke any one feature of an object to explain any other. Children of five and six, asked why the sun did not fall down, regularly gave such answers as "Because it is high up," "Because it is hot," and the like.

Piaget suggests that some of the superstitions or magical beliefs of children are partly to be explained by this syncretism. We may illustrate by an example which Piaget himself cites in another connection. One of his collaborators reported that if on his way to the dentist he passed by a particular street, and the dentist later hurt him, he took care on the next visit to go a different way, so that the dentist would hurt him less.⁹ To see how a similarly inadequate notion might develop in a more complex situation, let us suppose that a little girl at school happens to be counting to herself in a certain way just before she makes a particularly good recitation. The association between the two events may give rise to a belief on her part that if she can succeed in counting up to 25 with a certain rhythm between the asking of a question and her reply she will "have good luck"; and this may be extended to other situations. The connection is there, subjective though not explicitly formulated. Adults similarly rely upon irrational personal notions or schemes of their own, with the origin of which they are not familiar and which they have never thought out, but which may have compelling influence, at times, on their behavior.

A study of proverbs, made at the Rousseau Institute, illustrates particularly well the persistence of syncretistic thinking on an abstract plane, after the relations between perceived situations have been mastered. Each child was given a number of common proverbs and a number of sentences each of which corresponded in meaning to one of the proverbs, and was required to pick out the proper sentence for each proverb. Up to the age of eleven or twelve the children chose almost at random, but once having made a choice, they tended to accept it as correct, and justified their choice by explanations

⁹ Jean Piaget, *The Child's Conception of the World*, 144

which showed clearly that they were not inventing, but that the two statements were now connected in a subjective schema that possessed real unity for them. A nine-year-old boy chose for the proverb, "White dust will ne'er come out of a sack of coal," the sentence, "People who waste their time neglect their business." This boy explained that the meaning was the same, because people who waste their time neglect their children, who then become black (as coal is) and therefore need to be cleaned.

We may interpret Piaget's treatment of juxtaposition and syncretism about as follows. Between the years seven and eleven, on the average, the early syncretism of the child's experience gives way, under the pressure of individual experience and especially of social stimulation, to more analytical habits of thinking. He is forced by the conditions of experience to learn to react differentially to differing and changing aspects of the situations which he encounters; and as he does so, he gains "insight" into their essential features (cf. p. 301), and is able to make general statements about them which are more reliable, that is, more useful in effecting adaptation, than the vague subjective schemas which formerly prevailed. Thus the world of the child's experience is being continually broken up into more discrete groupings, and shaped again into more effective forms, as he learns better to adapt himself to his changing environment of things and of persons. The juxtaposition and syncretism which are characteristic of early thought give way to analysis and synthesis; intuitive thinking tends to become rational thinking. But this development is not, we may assume, completed in all children, and in no child, probably, is it completed for every aspect of his thought. There still remain, for almost every adult, certain regions of his thought which are as "impervious to experience" as the ordinary thought of the little child, regions in which the original syncretism still, as it were, holds sway.

The features of childish thinking which we have been considering are especially characteristic of the ages before seven and eight. From about that time, which we remember, seems to mark a decided decline in egocentrism, the child becomes increasingly able to handle relations, to take the point of view of others, and to reëxamine his own thought. This increas-

ing "consciousness of his thought," in Piaget's terminology, means that the child is acquiring more and more abstract concepts, that he is learning to generalize. A child of seven may say, "The sun is alive because it moves," but has not thought of the formulation which is really implied by this, namely, "All objects which move are alive."

It is when the child is stimulated by the questions, doubts, and attitudes of others that he pays attention to the implications of his statements in an effort to justify them. Thus he is stimulated to observe sequences of events; and he becomes able, when dealing with observed facts, or remembered or imagined facts, to see them in their correct logical relationships. But, Piaget says, during this middle period of steady growth in the ability to deal logically with observed or remembered data, there is still lacking the capacity to carry on formal reasoning. The child is able to deal only with situations in which he believes — situations, that is, which stand for actual or possible experience. This is shown by the responses to the Binet test, in which the child is asked to say what is foolish about the statement, "If I ever kill myself from despair, it will not be on a Friday, because Friday is an unlucky day. . ." Children under eleven were not able to make the necessary assumption, for if they did not have this particular belief themselves, they insisted that the absurdity consisted in saying that Friday is an unlucky day (J.R. 62-74). Thus children were unable to deal with the statement as an *hypothesis*. Now according to Piaget, in formal reasoning it is necessary to be able to start from assumed premises, regardless of their truth or falsity. This the children cannot do because of a lingering egocentricity which prevents them from entering into any other point of view, even for the sake of argument. Their thinking is thus still on an empirical plane, that is, related either to situations which they observe, or can remember, or can see would be possible for them. It is not until after the age of eleven to twelve that the average child can carry on the abstract type of logical thinking which involves making provisional assumptions.

If we accepted the definition of reasoning held by Piaget and somewhat differently stated by Dewey, and considered that it involves the comparing and testing of hypotheses as such, then certainly, if these conclusions proved to hold gen-

erally, we should have to say, as Piaget does say, that the child is incapable of reasoning before the age of eleven or twelve. One reason which might well be advanced for adhering to this conception is that it might have a good effect on practical dealings with children. Perhaps too much time is spent in trying to instruct, through formal reasoning, young children who are really incapable of profiting by such methods.

On the other hand, one could point out practical disadvantages in the use of this definition. It might encourage the drawing of a sharp line between the thought of children and adult reasoning, whereas there is really a gradual development in that ability in which we are after all most interested; namely, the ability to think effectively in problematic situations. It may also be urged that if we should keep the definition of the term so restricted, we should have to say that reasoning is extremely rare. Moreover, we should have to classify as reasoning many a logical but practically useless course of thinking, while refusing so to dignify other cases of quick and effective use of thinking to obtain adjustment in problematic situations. On the whole it would seem that a broader definition of the term, as the use of ideas in solving problems, has distinct advantages over the traditional conception adhered to by Piaget. This definition, which is entirely in line with Dewey's treatment of thinking and may well have been suggested by his work, is more objective than the other, seems closer to the common usage of the term, and permits us to think of reasoning as present in the very young child and growing in effectiveness with years. What Piaget has called reasoning we could then distinguish as formal reasoning or the rational elaboration of meanings (Dewey), and recognize it as a late and rather rarely employed, but exceedingly valuable development.

Piaget has been severely criticized for assuming that children in general do not reason before eleven or twelve. We should like to submit that, *granted Piaget's premises*, his definition of reasoning, this is true. The author, like most of her fellow psychologists in this country, does not believe this restricted definition of reasoning, as analytical syllogistic thinking, is the most serviceable for psychology. But if Piaget does (and he has eminent company in taking this position) we should meet him on his own ground. Huang, Deutsche

and others, using types of situations and methods different from those employed by Piaget, have shown that with certain types of problem, where the child has adequate information, he employs far fewer illogical modes of thought than did Piaget's children.¹⁰ These findings are important from both a theoretical and practical (educational) point of view. But they do not necessarily conflict with Piaget's main contentions.

Piaget writes in the main as if there were definite stages of development, and more clear-cut differences between the child mind and the adult mind than actually exist. But at various points in his books he insists on the tentative character of his work, and recognizes a great deal of overlapping in childhood stages of thought and between the child and adult thought. In the author's opinion we should be careful lest our own difficulty in assimilating so foreign a point of view may blind us to the real importance of what may in later years be recognized as truly epoch-making contributions. Surely the mind of the very little child must be different from that of the adult — very different. His body is different, his morals are different, his habits are different. Why should his thinking be the same? And is it not of the greatest importance from the point of view of an understanding of the history and the rôle of adult thought in our still terribly misguided world, to find out as much as we can about how thought really becomes socialized and "logical"? If we look for similarities between child and adult thought, we find them; if we look for differences, we find these. What we need to know, if we can find out, is how thought actually develops in the child.

Adopting our definition of reasoning as ideational problem-solving, let us inquire what are the essential factors in the reasoning process, and how the characteristics of child thought so brilliantly treated by Piaget, are related to these factors.

¹⁰ I. Huang, *Children's Explanations of Strange Phenomena*, Smith College Studies in Psychology, 1930, No. 1, 180 pp.; V. Hazlitt, "Children's Thinking," *Brit. J. Psychol.*, 1930, 20, 354-361; M. P. Harrower, "Social Status and the Moral Development of the Child," *Brit. J. Ed. Psychol.*, 1934, 4, 75-95; T. M. Abel, "Unsynthetic Modes of Thinking Among Adults: A Discussion of Piaget's Concepts," *Amer Jour Psychol.*, 1932, 44, 123-132; J. M. Deutsche, *The Development of Children's Concepts of Causal Relations*. Univ of Minn. Press, 1937.

FACTORS IN REASONING

It has been pointed out by psychologists, notably by Carr,¹¹ that reasoning regarded as ideational problem-solving has the same essential features as the overt mode of solving problems which we call *perceptual-motor learning*. Both types of adjustment originate in a problematic situation, in which the animal or person is prevented from satisfying some motivating need because of the presence of an obstacle or hindrance of some sort. Both involve a varied attack, the only difference being that the attack involves overt movements in one case and ideas in the other. In both there is elimination of unsuccessful movements or the ideational counterpart of these, namely inadequate suggestions. On the perceptual-motor level this elimination is determined largely by the sensory consequences of the act; and on the ideational level by the knowledge of the consequences of the suggestion or of its logical implications. Finally, the successful solution, which is a part of the equipment of the learner or solver and the occurrence of which is more or less a matter of "chance," is fixated in both cases — through a series of trials in the case of overt acts, and through practice and memorization in the case of ideational solutions, although often very little repetition, or no more than one occurrence, is necessary for the retention of an idea.

A feature of the process of solution in reasoning is the verification of hypotheses or suggested solutions, by putting them to the test of an overt response or application. This step is absent, as such, from perceptual-motor learning, for here each act is its own verification. It is so important, however, in reasoning, that we shall discuss it as a special factor. One factor in reasoning, namely fixation through memorization, we shall not treat as such at this time since the principles involved seem fairly clear and it might more properly be given a fuller treatment in a discussion of memory. We shall here take up, as the three chief factors in the reasoning process, the problem, the solution, and the verification of the solution.

The Problem. — The first problems which the child en-

¹¹ H. A. Carr, *Psychology*, Longmans Green, 1925, chap. 9.

counters are perceptual in character; that is, they involve some difficulty in adjusting to a present concrete situation. When the child gazes longingly at a high pantry shelf, seeing no means of reaching the cooky jar, he is responding to such a problem. Concrete problematic situations continue to occur throughout life, of course, but more and more complex ones are likely to be encountered as the child grows older, while the stock of ideas which may be utilized in meeting them increases enormously. As soon as the child is able to reconstruct past or future events ideationally, he begins to encounter ideational problems ("What if I lose my ball again on the way to school?"), and in advance of the actual situation he may think out modes of adaptation. One little six-year-old girl, dreading the heat of the summer afternoons, carefully screwed caps on some fruit jars in the coolest part of the garage one evening, expecting next day to let the cool darkness loose. Gradually as his experience widens the child is able to face problems that are more and more remote—"What shall I do when I am grown up?"; "What kind of games would I play if I lived in the country?" But all through the years of middle childhood it is very difficult for the child—impossible, in fact, according to Piaget—to assume a problematic situation which is not probable or possible for him. He must believe in the possible truth of the premises before he will reason, because of his great difficulty in seeing that other points of view than his own exist. This difficulty of adopting the points of view of others of course puts serious limitations on both the range of problems and the fertility of the individual attack.

Since all reasoning starts in a problematic situation, adults who wish to encourage it in children will see to it that they have genuine problems with which to deal. Just as in the case of sensory-motor learning, so in the case of reasoning, the importance of providing strong motives and providing or pointing out genuine problems is evident.

The Solution.—In any problematic situation which an organism encounters responses will occur, native or acquired, according to the nature of the situation. If the subject has had experience in meeting somewhat similar situations and has acquired knowledge of different possible modes of pro-

cedure, various ideas will be aroused, constituting hypotheses or suggestions of possible solutions of the problem. These suggestions may occur one after the other in a more or less haphazard way, or they may be subjected to logical analysis and systematically varied.

The series of responses in this "varied attack" upon a problematic situation may be entirely overt, partly overt and partly ideational, or entirely ideational. In any case we have a mode of attack which is trial-and-error in character, for we cannot predict how soon the correct response will occur, and the organism will keep on responding in some way as long as the motivating stimulus is dominant, until a response happens to occur which solves the problem.

Experiments by Köhler on problem-solving in chimpanzees,¹² which have been followed by a number of others employing the same general methods with both animals and young children, beautifully illustrate the essential identity of the motor and ideational methods. Köhler put his chimpanzees, when hungry, in situations where food was present and seen but unobtainable except by manipulating objects in a particular way. For example, a chimpanzee was put inside a barred cage. Outside was a banana, which the animal could obtain only if he fitted together two hollow sticks which lay near by, thus making one long enough to rake in the banana by reaching the stick through the bars. Or the banana was suspended by a string from the ceiling in such a way that it could not be reached directly, but could easily be obtained by moving a box underneath, or by piling two boxes one upon another in a particular way. In most of the animals there were a good many overt movements which were not successful. The animal would run about, push the boxes now in one direction, and now in another, and the like, in a more or less desultory manner. Occasionally, after pausing and eyeing the boxes, the chimpanzee would suddenly go to a box, rapidly put it in the right position under the banana, mount, and obtain the food. It seems highly probable that such a solution is genuinely ideational; that a symbolic representation of the act (an hypothesis) precedes its execution. The hypothesis is implicit only, to be sure,

¹² W. Köhler, *The Mentality of Apes*, Harcourt Brace, 1925

and not rationally elaborated; but it takes its place among the overt acts as one of the varied means of meeting the situation. Sometimes the idea happens to be correct, at other times it does not work. For example, an animal which seems to have "got the idea" of piling two boxes one on the other underneath the banana, may fail because he sets a second and smaller box above the open top of the first: he has not happened to grasp all the essential points in the situation.

Other investigators using about the same methods with young children have observed that they behave very much like the chimpanzees, except that there is more ideational activity.¹³ In the children the presence of ideas is often shown clearly through their speech. We may cite an example of persistent and varied attack, including ideational responses, from among a number described by Dr. Alpert in her study of problem-solving by preschool children, in which she placed children as nearly as she could in the same sort of situations that Köhler used in some of his work with chimpanzees. One little girl aged three years and two months was placed in a play pen outside of which was an attractive toy. Inside the pen were two halves of a fishing rod, by means of which the child could obtain the toy only if she fitted them together. This little girl, who had had experience in reaching with sticks, first tried to get the toy by extending one of the sticks over the top of the pen, then tried the other, repeating, "I can't," over and over. She then tried putting the stick out between the bars, struck it against the floor, whined, reached over the top again, straining, then tried to climb out. In the next two trials she tried these and other means, such as reaching out her hand between the bars and shaking the pen, saying at one time, "Dolly does not want me to get him," a thought which if seriously entertained might have stopped the "attack." In the fourth trial she started reaching as before, and asked the experimenter to move the toy nearer. Then she said, "Let's try big stick on little one," after which she proceeded to fit the

¹³ A. Alpert, *The Solving of Problem Situations by Preschool Children*, Teachers College, Columbia Univ 1928, Contrib to Educ, No 323. See also E. Matheson, "A Study of Problem Solving Behavior in Preschool Children," *Child Develop.*, 1931, 2, 242-262, and an interesting study of problem solving in infancy by H. M. Richardson, "The Growth of Adaptive Behavior in Infants: An Experimental Study at Seven Age Levels," *Genet Psych Monogr*, 1932, 12, 195-359.

two sticks together carefully, reached out, and got the toy. Here the "chance success" which solves the problem is clearly an ideational representation of an act, an hypothesis. The attack is varied or somewhat random, and the discovery of the solution is a matter of chance, as Carr explains, in so far as its nature and time of emergence cannot be predicted or foreseen.

Köhler, and Alpert following him, refuse to call a "chance success" any solution accompanied by, or the result of, insight. But most psychologists do not take this position. The time and nature of ideational solutions can no more be predicted than motor solutions, and whether either occurs depends upon the nature of the situation and the equipment of the organism. Not even a perceptual-motor attack, of course, is purely random and chaotic — chance is a relative term implying unpredictability. In the varied and somewhat unpredictable behavior that is likely to ensue when an animal encounters a problematic situation, ideas may be few or prominent. Even if the attack is entirely ideational it is a trial-and-error process in which the correct idea may occur soon or late or not at all, depending on the circumstances.

Children rapidly acquire ideas — memorial, imaginal, and conceptual — which enable them increasingly to "reason out" the solution of the problems that confront them. But for some types of problems and in some circumstances overt movements are employed by adults. Ruger in a well-known experimental investigation required adults to solve mechanical puzzles, and reports varying amounts of ideation in the solution. Sometimes solutions occurred through random overt manipulation alone, but usually various hypotheses were also framed and tried out one after the other in an attempt to effect a solution.¹⁴ Various studies have been made of reasoning in adults in which the entire attack was ideational, and the process of trying out and discarding hypotheses was closely observed. These studies show, as we should expect, that even in adults there is often not a systematic effort to try various types of solution, and sometimes a method of procedure which has failed to bring success in preceding trials is, just the same, repeated again and again. The human subject, even though adult and intelli-

¹⁴ H. A. Ruger, *The Psychology of Efficiency*, Arch. of Psychol., 1910, No. 15

gent, is prone to fall into stereotyped modes of attack, and often simply puts forth the first answer that occurs to him, without effort to recall whether it worked before, or to compare it first with other answers which he might give. Thus an ideational solution may not be very completely varied, and in many ways the intelligent adult may still behave at times much like an animal in a puzzle-box.¹⁵

In such behavior as that of the little girl in Dr. Alpert's experiment, we do not find at all that comparing and testing of hypotheses which Piaget says is the essence of reasoning. In her case each hypothesis as it occurred was immediately translated into action, and the hypothesis as such was not thought *about* at all. It is almost the same sort of thinking that sometimes occurs with adults when working out problems. Sometimes, for example, when arithmetical operations are required, one device after another will be tried in the hope of getting a solution which will check, and the bearings of each device are not considered. The adult subject may simply sit by, as it were, and let suggestions more or less passively arise according to the situation, trying out the various ones to see if they work but *not* actually tracing out their implications before the trial. This is why old methods that have failed may be revived time and again. Thus it seems probable that in most reasoning in young children and in much of adult reasoning what Dewey would call rational elaboration is absent.

In the most effective reasoning, however, there will be systematic consideration of the bearings of each hypothesis that occurs. The thinker supposes that the act takes place, and then traces out the consequences. If he has wide knowledge in the field, he will be able to tell better what the consequences of a suggested solution would be, than a person of limited knowledge. After considering the bearings of an hypothesis the thinker may reach the decision that it is not a good one, that the effects of its application would not solve the problem. Thus the suggestion is not acted upon in any way and the thinker reconsiders the problem, with

¹⁵ E. Heidbreder, *An Experimental Study of Thinking*, *Arch. of Psychol.*, 1924, No. 73, J. Peterson, "Experiments in Rational Learning," *Psychol. Rev.*, 1918, 25: 443-467. Compare G. V. Hamilton, *An Introduction to Objective Psychopathology*, Mosby, 1925, chap. 7, 240-259.

the result that another hypothesis occurs which is similarly analyzed. Experience in handling hypotheses has enabled human beings to formulate logical devices which help to determine the probable relative validity or usefulness of different hypotheses, and a knowledge of these devices will be helpful in reaching conclusions. But no application of logical rules or devices will enable a person to invent a solution which has not been suggested in accordance with the nature of the problematic situation. The solution must originally come from the experience of the thinker, and the logical manipulation of meanings which we call formal reasoning affords no guaranty that a correct solution will be reached. In other words, however abstract the situation becomes, however remote from concrete situations the problem, and whatever concepts are utilized in dealing with it, the process remains one of trial-and-error adjustment.

It is evident that in general the more variable the attack, that is, the greater the number of possible solutions, the more likely it is that the correct solution will occur. This means that a child will always be handicapped in comparison with an adult through relative paucity of ideas, just as a person specially trained in a given field will have an advantage over one who is not; and that the individual who is able to assume the point of view of another will be more fertile in suggestions than one who is restricted to his own or a very narrow point of view. The ability to entertain a large number of hypotheses ranging over a wide field and representing various sorts of experience, is seen to be fundamental for effective reasoning. One who is widely versed in practical knowledge or knowledge within a given narrow sphere may reason very effectively in problematic situations demanding adaptation within that sphere, but for the solution of more abstract problems or those involving adaptation to distant or future situations of some complexity, a much wider knowledge is essential. Through teaching and through books and conversation children learn solutions which in the experience of the race have been found to work, and in this way they may profit by the accumulated knowledge of the race without going through the process of learning and of discovery as individuals.

Besides the possession of a wide stock of ideas, training

in those methods of attack which have been found helpful by others is also an important factor in effective reasoning. The study of formal logic is not essential to effective elaboration of meanings, but it is sometimes an aid. A knowledge of the psychology of reasoning is more helpful for practical purposes than a knowledge of formal logical procedures. Individuals who know the value of persistence and a widely varied attack will have an advantage over others who trust to some faculty and the knowledge of logical procedures, and believe that reasoning depends chiefly on a mysterious "reasoning power." The ability to approach a problem in a spirit of play, with a willingness to consider any suggestion whatever, no matter what the source, is seen, from the point of view here developed, to be very important.

Verification. — The final step in a complete act of reasoning, Dewey insisted in 1910, is verification, the process of putting a solution to the actual test. In the primitive reasoning of the little child, as illustrated in Alpert's experiments, this step almost inevitably occurs, for the ideas arise in concrete situations, and are immediately translated into action. The very little child has not formed the habit of delaying or comparing hypotheses previous to application. But when the problem is more abstract and a number of hypotheses are involved, the matter of verification is not so simple. In that case immediate overt adjustment is not required. After an analysis has occurred a certain suggestion is accepted as reasonable; that is, the thinker believes that if it were put into effect the consequences would to some extent satisfy the motivating need. But it has not been possible to consider exhaustively all of the factors in the situation, and there is the theoretical possibility that some of the discarded suggestions might be better. Meanwhile, until an actual trial can be made, the accepted solution is retained as a provisional hypothesis or as a belief.

In problematic situations to which an overt adjustment must or can be made, verification proceeds by direct overt trial. In many cases, however, the problem is not an immediate practical one, as, for example, the problem of accounting for the origin of rain; and in such a case the thinker may gradually gain verification of his solution by watching events as they occur in nature. Or he may make experiments

in which he reproduces the assumed conditions to see if the result corresponds with his theory. Very often, however, conditions are such that verification cannot be obtained for a long time. This is the case when the situation is very complex and the trying out of the suggested solution involves a number of practical measures the efficacy of which it is hard to judge. The trial of Federal prohibition as a solution of the "liquor question" illustrates this point. In the case of some theories or beliefs direct verification can never be made; and this is most likely to be true when the original problems are of a highly abstract character. Many beliefs in the fields of philosophy and religion are thus unverifiable.

In problems requiring complex solutions, or highly abstract problems, or in fact any problems which do not demand or cannot receive immediate verification, there is most opportunity for inadequate thinking and the retention of irrational beliefs. We have suggested that adults are prone to react ideationally in an incompletely varied manner, and that the suggestions which occur to them are by no means regularly submitted to careful comparison and analysis. Where verification is not demanded, we shall expect them, therefore, to entertain many highly unreasonable beliefs. Moreover, we shall expect that these beliefs in the absence of convincing checks, will tend to correspond to their desires, prejudices, and previous habits of thinking. This will be true because such factors constitute parts of the total motivating situation. That stimulating situation is basic in the problem, and actively influences conduct throughout the course of the thinking, until some solution occurs which satisfies it to some extent, and thus ends its dominance. Naturally those solutions which correspond most closely to the habit-trends of the thinker and his personal desires will afford him most satisfaction, in the sense that they will keep him from being disturbed by thoughts which might conflict with those trends and desires. Some of the irrational modes of thinking which serve as a substitute for genuine reasoning which involves a freely varied attack, we shall take up in the next chapter, in connection with the problem of motivation.

The consideration that the absence of a need for verifica-

tion favors hazy and irrational thinking suggests one of the most important reasons for the fact that childhood thought is as a rule "wishful" and full of crude and even contradictory beliefs. For in young children the need for verification is conspicuously lacking. Why? The answer may be sought in a consideration of the egocentrism and the "incommunicability" of early thinking. In the course of his experience the little child rapidly learns ideational meanings for the things he sees and the words he hears; but these are implicit only, and really do not take definite shape, become formulated as beliefs which can be expressed to others, until doubts and questions arise. His increasing intercourse with other people provides the series of checks and questions which finally force the child to a clear statement of his notions, and stimulate him to seek justification and verification for them.

The author's observations of the spontaneous remarks and questions of children have furnished her, at first to her surprise, with many concrete illustrations of some of Piaget's leading concepts. They have also illuminated for her various obscure problems in the field of thinking. The following citation from an informal diary illustrates several points:

We were driving along a country road near sunset time when X, age seven years and three months, asked, "Why does the sun follow us?" I have never heard anything from her about this before. I ask in a casual way, "Why do you think it does?" She says, "It *seems* to." "If you stop," I ask, "will the sun stop?" "No!" X answers, with a degree of scorn which suggests that she used to think she could make it stop. We drove along saying nothing. Suddenly X startled me so that the car swerved slightly, by giving a sudden very loud yell. Then she said to me, in a characteristically "I-told-you-so" manner, "*The sun doesn't hear us*" (as if to say, "See, I told you it only seemed to!").

After supper, as I was putting alcohol on X's legs for mosquito bites, she flinched and asked soberly "Is alcohol alive?" "Why do you think it may be alive?" "Because it bites you so." Query. does the question about alcohol this same evening indicate that she is now consciously trying to systematize her thoughts?

This is only one of a great many incidents illustrating the growth of self-criticism and the gradual abandonment of early animistic and magical beliefs on the part of this child. It is significant that such incidents invariably occurred when

we were alone together, relaxed and with nothing in particular to do. Ordinarily these modes of thought are not expressed in speech, and are easily overlooked even by people in intimate daily contact with a child. The same ideas have been revealed by another child, though in different ways.

Piaget asked a large number of young children this question, which is so phrased as not to be suggestive, "When you go out for a walk, what does the sun do?" The spontaneous remarks which followed indicated clearly an implicit belief, now perhaps stated in words for the first time, that the sun followed the child constantly; and they showed also a complete absence of doubt as to the correctness of the belief. The statements were made promptly and confidently, and in all seriousness. Some of the children believed that the sun watched over them, purposely gave them light, or looked to see if they were good or naughty. In general it was not until the age of eight, which according to Piaget marks a rapid decline of egocentrism, that the children began to show doubt and hesitation about the idea that the sun followed them; and not until still later had they accepted the theory that the sun stays in the same place all the time.¹⁶ Thus, questions or expressed doubts on the part of others "liberate convictions" which were formerly implicit only; provide conditions for the acquisition of habits of self-criticism and analysis which lead the child more and more to seek verification for his beliefs; and make it possible for him finally to regard his ideas as hypotheses only, until they have been submitted to actual verification. In the process of seeking verification for an hypothesis, a new problem is likely to arise. And so doubt leads to doubt, question to question. Thus it is that in a normally responsive and active child, his thoughts about the world, subjected more and more to actual test, become more accurate; and the field of his knowledge comes to exhibit a more ordered unity in place of the early vague syncretism.

But the "incommunicable" character of the thought of young children cannot alone explain their failure to seek verification for their beliefs, for we find unhesitating confidence persisting after these first naïve years, in regard to beliefs which have been clearly formulated. Stern and the

¹⁶ Jean Piaget, *The Child's Conception of the World*, 214-219.

Aussage investigators, we recall, as well as the Swiss group, found this self-assurance more characteristic of the years of middle childhood than of later years; and anyone who knows ten-year-old children well can furnish corroborative testimony. A further reason for the persistence of this primitive attitude into middle childhood and even adult life, is its relation to the well-known early belief in the infallibility of the parents, with the habit of depending on authority which this belief encourages. As long as it never occurs to the child to question the judgment of the parents, he himself will lack a certain stimulus to question his own. He cannot very well build up a belief in the value of suspended judgment until he sees it illustrated, and has a chance to learn what are the results of such an attitude. Now parents must consistently play the rôle of omniscient beings while the child is very little; and not a few are willing to let him maintain this early trust in their judgment as he grows older. Some more or less deliberately encourage this dependence.

The result is that even after the child makes the inevitable discovery that his parents may err, he tends merely to transfer his trust to other authorities, for example to writers of books and to teachers. And these, for the most part, keep up the parental fiction of infallibility, having the attitude of "laying down the law" for the good of the child. Teachers as a rule, not realizing that "mistakes" are an essential part of a true reasoning process, so frown upon them that the child comes to think of them as dreadful things. With such examples constantly before him from the earliest years, it is to be expected that children will tend to cherish their own beliefs. There will be little chance for them to build up a conception of the value of hypotheses as opposed to fixed beliefs. On the contrary, seeing adult authorities constantly rush to the defense of their own ideas as the true ones, the children, still under the influence of their childish attitude of trust, will suppose that this is the thing to do — that to admit the possibility of being in error is somehow unworthy. Thus in the give-and-take of his everyday experience is the child likely to develop a primitive and inadequate conception of truth.

We might consider what would be the effect if parents should adopt the policy, from the first, of admitting their

own mistakes, quite simply and naturally, whenever they occur. Some see in such a policy an important means of encouraging the child to develop a respect for truth and a tentative habit of thought, others insist that this would be a dangerous policy in the early years when the child is not yet able to think for himself. The first theory is being tried out by a few parents — one mother known to the writer is careful always to say to her young children, "Mother thinks this is best," instead of "Mother knows best." The second policy is the traditional one.

Applications. — Our analysis of the chief steps in reasoning as a trial-and-error method of adjustment in problematic situations suggests certain applications. The adult who would teach a child to reason well should not wait until the child is old enough to handle formal logical relations, but must seek from the first to develop the problem-solving attitude which is basic in all reasoning. To that end he will try to provide genuine problems, and will whenever possible withhold his aid in their solution. He will make possible an increasingly varied attack by giving the child as rich an experience as possible, so that he may have a broad and flexible knowledge both of things and of people, and so that he may learn to appreciate points of view other than his own. In order to develop in the child the ideal of maintaining an attitude of suspended judgment rather than dogmatic belief, and devotion to truth rather than authority, the wise parent will refrain from claiming infallibility for himself or anyone else, and will consider that any belief is open to question. But, knowing that the only real test of the adequacy of a theory is the sincere and consistent application of it which involves the step of verification, he will encourage the young thinker, by example as well as by precept, to act consistently on the basis of those beliefs and theories which, in the light of the experience of the race as he knows it, and of his own careful thinking, seem the most reasonable.

SUGGESTIONS FOR READING

In the author's opinion three books have been of outstanding importance in helping students of child psychology to see how thinking has developed in the child and in the race. These are Dewey's *How We Think*, James Harvey Robinson's *Mind in the Making*, and Piaget's *Child's Conception of the World*. . . Most of the author's fellow psychologists would not, it seems, agree with her evaluation of Piaget. See especially Deutsche's "The Development of Children's Concepts of Causal Relations," which deals, however, only with one aspect of Piaget's theories.

CHAPTER XIII

THE SIGNIFICANCE OF PROBLEMS IN MENTAL LIFE

IN THE THREE preceding chapters we have concentrated mainly on intellectual aspects of mental life. But we have been aware that these are intimately related to the growth of other modes of adjustment, that they are conditioned by motivation which is never purely rational. Errors in perception, in memory and in thinking, unconscious bias and distortion even in what may seem to be purely rational adjustments, are inevitable in human beings. A consideration of the main types of problem which arise through the thwarting of motives, and of some of the common modes of adjustment to these problems will make more clear the relationship between intellectual and other aspects of mental development. Such a treatment will also provide a basis for a later analysis of the way in which personality traits develop.

In an earlier chapter we pointed out that organic motives such as hunger, sex, and the need for exercise are very early in childhood richly supplemented by learned modes of response, so that as the child grows older his behavior is increasingly dominated by desires, purposes, and volitions. A still more complex type of motivation may be considered at this point, namely *sentiments*. This term has been used effectively by the English psychologists Shand and McDougall, but is best defined in the words which Hart used in a somewhat broader sense, as an emotionally toned system of ideas connected with a particular object or situation.¹

Loyalty to the parents is a sentiment for which there is a nucleus even in infancy, in the conditioned emotional responses toward the parents which the child early acquires, and which soon develop into what we call love. Gradually the average little child learns to think, as a natural result of his experiences, that the parents are extremely wise, extremely good, and also strong and handsome. They can

¹ B Hart, *Psychology of Insanity*, Cambridge Univ. Press, fourth ed., 1930

answer every question that he asks them, they always know what is right and wrong, they can do just what they please. These ideas become systematized as the child grows, and tend to be reinstated whenever the parents are thought of. Moreover certain desires and hopes of the child are inextricably bound up with the parents: it is they who provide his food and clothing, they who have promised him that he can travel when he is older; they who will always comfort him when he is hurt. At times the child feels resentment toward his parents, but this is likely to be temporary and not to be closely associated with the normal love-relationship.

The main emotional and ideational responses in a sentiment come to be closely organized, since they are practiced together in varying combinations with reference to a common object (in our example, the parents). Hence any one of these responses, evoked at any time, will tend to arouse the rest of the system. Although not all of the related ideas will be fully aroused, there is bound to be a partial arousal of the symbolic responses, and these may then enter into and modify the total motivating situation affecting the individual's conduct at the time. The emotional components of the system will likewise tend to be aroused, and while the individual child may not be, and probably seldom is, conscious of the emotion as such, the resulting visceral "tensions," released glandular secretions, and the like, will remain for a while to play a part in motivation.

Since an emotionally toned system of ideas may be aroused incipiently, it may dominate behavior although the child is unconscious of the main elements. Suppose another child intimates to a small boy that his father has not a very high position in the office where he works. Instantly the boy "flares up," tells what important things his father does, and seeks to make the father seem more important by contrasting him with others. If the remark was particularly pointed, the boy may attack the other boy physically, or during the course of the day may think up ways of showing him his error. Thus, although it is primarily a question of fact whether the father holds a high position or not, the discussion is charged with emotion because of the powerful sentiment motivating the son. In time this blind devotion will

probably change, but irrational or emotional elements will normally remain a part of the sentiment.

Words and objects, such as slogans, flags, and badges, come to stand for special sentiments and tend whenever encountered to arouse the appropriate non-rational responses. These symbols may serve throughout childhood as nuclei for expanding sentiments. In children, and in adults who continue to acquire new ideas and new attitudes, sentiments will continue to change and grow. In others who by training are "set" against the acceptance of a new idea, the long-practiced system will continue to function almost unchanged, until in some individuals it may become an almost completely isolated system, or what Hart calls a "logic-tight compartment." Such logic-tight compartments, or complexes, are present in every normal person, but in different degrees. In some people certain complexes become so isolated, so completely impervious to social influence, that they are definitely abnormal, that is, they seriously interfere with the ordinary social relationships of the individual.

Sentiments leading to negative modes of response of course develop also in the child. An example is the fear of germs which in one sensitive and imaginative little girl became a persistent sentiment, a genuine complex. Her mother early told her, on various occasions, about the germs that hide unseen in milk and water and unclean food, dwelling on their horrible appearance and the sickness and disease they might cause. The child was forbidden in the strongest terms to use any dish used by another person, to drink from a common drinking-cup, even to finish a piece of cake left by her father. As a result she acquired an emotional attitude toward all these acts, and thought much of the awful suffering caused by germs. She did not know that some germs are beneficent, and often felt a fearful wonder that there was no more illness in the family than there was. One day at a state fair, when very, very thirsty, she impulsively took a gulp or two from a glass of lemonade put down by a stranger. She was immediately stricken with regret, and feared that she would become very ill. Although as a grown woman she possesses more accurate information about germs and their effects, the results of this early "sentimental" motivation are to be seen in her overscrupulous care in

sterilizing her baby's food and his playthings. The difference between such a sentiment and a complex which is expressed in an abnormal hand-washing mania is clearly not great. The difference between normal and abnormal motivation of this sort is not one of kind, but merely of degree.

PROBLEMS ARISING FROM THWARTED MOTIVES

Motives imply problems. Since a motive is a stimulus which continues to affect the organism until something happens which alters the stimulus, an animal faces a problematic situation, objectively speaking, until that something happens. For animals, in general, problems will arise only in connection with the thwarting of organic needs. The same holds for infants. For them problems are likely to be less serious than for animals, since the necessary adaptive responses are usually made, and made promptly, by some adult. Most young children are so carefully watched over that, in physiological motives at least, satisfaction is soon possible. But as the child develops the strength and acquires the habits necessary to satisfy his chief needs, social aid is, usually, more and more withdrawn, so that he himself has to make necessary adjustments.

Perceptual Problems. — The first problems are perceptual, that is, some present physical situation prevents immediate satisfaction of a motive. Carr has pointed out the main reasons for failure to make an immediate adjustment in a perceptual situation. It may be due to a lack of motor ability to satisfy a given motive, a lack which is responsible for many problems of infancy and childhood. Again, environmental means of satisfaction, such as food, may be lacking, or environmental obstructions, such as a stairway, may be present. Finally, adjustment may be delayed because antagonistic tendencies are aroused in the organism at the same time.² The last is illustrated by the case of a small child alternately tending to pat a furry dog, and to shrink and cry because of its quick movements and its barking.

Ideational Problems. — These may arise in exactly the

² This and the following analysis of the reasons for problems and conflicts are based on the treatment of problems in learning and in reasoning in Carr's *Psychology*, pp 87, 199-202

same types of situation as perceptual problems, since the individual is able to anticipate difficulties in advance, and to try out different possible solutions in thought without carrying them out overtly. Moreover many new problems arise, since by means of ideas the number of the child's desires and needs is very greatly increased. Thus as soon as the child begins to use language, his motives multiply as if by magic, and problems are continually encountered.

When incompatible modes of response occur in thought as possible solutions of a difficulty, their clash creates a new problem. The individual who makes first one decision and then another as to what to do, is activated to continual thought of some sort until a line of thinking occurs which is not opposed to others. This clash of thought has a definite physiological basis, we must assume, since ideas as symbolic responses tend to reinstate in incipient form the overt behavior for which they stand. In other words they arouse impulses. Ideational motives keep recurring and keep the person disturbed until some action is thought out which ceases to conflict with the tendency aroused by the original motive. We should expect that conflicts in thinking would occur subconsciously also, and as we shall see later, there is excellent evidence that they do.

When an individual continues to waver between two or more courses of action, it means, clearly, that two or more motives are alternately dominant, only one of which can be satisfied. When a problem arises, an impulse to solve it in one way is blocked because another motive is aroused in the total situation. For example, a young girl working as a maid in the home of well-to-do people may be continually tempted, by the sight of pretty articles of clothing left carelessly about, to take some for her own use. But no sooner does the idea occur to her than it brings up thoughts of her mother's strict teaching, and also awakens her desire to be true to her religion. Then it occurs to her that these people do not need this clothing, while she really does, and she reflects that it isn't right for some to be cold while others have more to wear than they need. This in turn brings up the thought that she must lie if she takes the things. But that is wrong. And so it goes: as long as the girl is poor and the things are at hand, the situation keeps recurring.

Conflicts.— If the motives arousing the opposing tendencies are about equally balanced, or if additional motivating factors enter in to urge the subject first one way and then the other, as is often the case, then final action may be long deferred, as only one of the mutually antagonistic lines of activity can prevail. Carr has listed the types of mental conflict which are most likely to arise. Of these, the conflicts between individually and socially motivated impulses are probably most important psychologically. The three-year-old shows the beginning of an important aspect of development when he first hesitates before appropriating the toy of the child next door. A five-year-old girl, sitting next to the author at dinner, betrayed an inner conflict when, asked by her mother to give up one of her cookies, she slowly held out the larger one, then partly drew it back—made, in fact, a number of quick wavering movements before she finally, with an ostentatious gesture, placed the larger cookie firmly on the author's plate. "Shall I go out to play, or help Mother who is tired?" "Shall I buy a new toy with this money or give it to the miner's children who haven't enough to eat?" These questions illustrate common childhood problems. At almost any time during childhood, but especially after the beginning of the physiological changes of puberty, problems connected with the sex motive may arise. An acquired and strong tendency to secure satisfaction by handling of the organs is opposed by social teachings which have been so firmly fixated that they furnish strong counter motives. After the child is physiologically mature the chances of sex conflict are greatly increased because there is more intense internal sex motivation.

Other types of conflicting tendencies need be little more than mentioned, for in the case of each it will be clear to the reader how inevitably present and important they are in the mental development of a normal child growing up in civilized society. There is the antagonism between immediate and remote ends. "Shall I spend all my allowance this week for movies and candy or shall I go without the candy so that I may buy a better present for Dad's birthday next week?" There is the conflict between material and ideal values—to cheat and obtain a prize, or to refrain and be true to an ideal. There is the difficulty of deciding between

various future alternatives — to go to a boys' camp in the woods or to spend the summer with the family at the seashore; to take the commercial or the classical course in the high school.

More and more acute, with the approach of maturity, becomes, for the intelligent child at least, the clash between old beliefs and new ways of thinking. As Carr points out, there are very likely to exist, in the same person at the same time, differing systems of attitude and belief which may come into opposition. The ethics of the business man in his daily conduct of life often do not accord with his religious beliefs, and if the two systems of thought come into conflict because roused to activity in the same situation, mental adjustment may be very difficult. Such differing systems, of course, have been slowly built up, and in the early growth of a child's personality we may often see their beginnings. In many thoughtful children such conflicts are real and recognized to an extent not realized by an adult who has found a satisfactory rational (or irrational) solution. For instance, children are usually taught to be kind to all living things; yet farm children see chickens killed for dinner, and a favorite calf sold to be killed for veal. Problems thus arising may become acute for some children. Little Peterkin in the poem kept asking what the battle was all about—it seemed to him simply a very wicked thing.

The Importance of Problems in the Development of Personality.—Most problematic situations provide normal stimulus to interesting activity. There are motor skills to be mastered, outer obstacles to be overcome, school work to be done either with zest or unthinking submission to a routine imposed by others, and interesting puzzles, mechanical and intellectual, to be solved. The existence of problems, faced as such by the child who has an adequate equipment for attaining satisfactory solutions, is, as we have seen, absolutely essential for the development of normally independent personality. They are basic in sensory-motor learning as they are in thinking. Adults should therefore not only refrain when possible from helping the child who is facing a problem which has arisen naturally; but they should create new ones, when the child is ready for them, not only by implanting new motives, but by pointing out

obstacles or difficulties of which the child alone would not have been aware. Only by so doing can they help the young child out of that egocentric self-confidence which prevents the development of clear understanding and really effective thought and action.

Problems may, however, sometimes become so difficult and serious as to interfere with normal personality development. This may happen because of physical weakness or deformity. For the weak or crippled child the inability to acquire effectively motor skills which are common among children may constitute a serious handicap. The same motives for the learning are present as for other children, but inability adequately to satisfy them may leave the child with a sense of weakness and inferiority which will entail mental crippling also, unless it is wisely dealt with. Equally or even more serious situations may develop where a child is expected by either parents or teachers to do school work or other work which is beyond the limit of his native capacity. Poverty often entails for children a serious lack of the means for satisfying dominant motives—desires for recreation, for beautiful surroundings, for travel, for education. Environmental conditions which may cause serious problems for a child include class, racial, and religious barriers of various kinds. These social attitudes may stand in the way of the child's attainment of his chief social needs, as the presence of physical obstacles—streams, mountains, desert spaces to be crossed—may hinder the animal from getting food.

Finally, problems may become abnormally difficult because the child is equipped with too strongly fixated antagonistic tendencies, so that instead of normal healthy opposition which is more or less satisfactorily resolved, a state of conflict ensues when an adjustment to a certain situation is demanded, a conflict which, as long as it is unresolved, may keep the child unhealthily absorbed in reactions to one or the other of the dominant motives. Such conflicts are particularly likely to arise between individual desires and the wish to conform to social standards which have been fixated in the child by emotional teaching. When a child continually feels an impulse to do something which he has been taught is shameful and wrong, conflict is to be expected and

will continue until he finds some way of adjusting to the situation which does not conflict with social teachings, or until he works out standards of his own which satisfy him.

Undoubtedly sex conflicts are at present the ones which most commonly become serious. The child whose time and energy are absorbed by trying to think and act rightly about this subject is prevented from giving attention to other problems which are also of importance to him. But conflicts between desires to take up this or that life work, between various views of the world, between opposing religious beliefs, any long-continued mental struggle, in fact, may become as serious as sex conflicts.

Serious conflicts are undesirable chiefly because when a strong motive more or less persistently fails of adequate satisfaction, some undesirable or even abnormal type of adjustment may become fixated as an indirect means of satisfaction. Thus instead of merely creating a stimulating problem for the child, the clash of motives may result in a devitalizing conflict which interferes with normal development.

INDIRECT MEANS OF SATISFYING MOTIVES

It is a very important point, psychologically, that for all except the basic organic needs which must be directly met if an individual life is to continue, *a good many indirect means of satisfying a motive are possible*. This is true even for the mature sex motive, for although the direct satisfaction afforded by sexual intercourse is necessary for racial survival, it is not necessary for individual survival and may be kept from dominating in various ways. Only a detailed analysis of specific leading human motives, with a discussion of means of satisfying each, could make this point perfectly clear; but a brief description of the leading types of indirect adjustment which are possible may clarify the general situation. Before discussing these indirect means let us recall that a motive is said to be satisfied when something happens which alters or removes the stimulating situation so that the individual is no longer affected by it.

Compensation.—When a strong motive cannot be completely satisfied through a direct attack on the stimulus, the

individual may yet obtain partial direct satisfaction by indulging in some related activity which relieves the tension somewhat, and makes up to him for the lack of complete fulfillment. To illustrate, let us take the case of a high school boy who has fallen in love with a girl. Her family will not permit her to associate with him, and they finally take her off on a trip to Europe. There may be partial resolution of the resulting conflict through writing long emotional poems, through romantic daydreams, through taking part in a melodramatic play, through reading love stories, or through dancing and going out with other girls. Each of these ways of acting is directly compensatory in that it provides more or less direct partial response to the sex stimuli which are disturbing the boy. There seems to be little question that in dancing, erotic daydreaming, and other types of emotional outlet, partial sex responses occur, chiefly internal and visceral. Such responses serve to change the physiological condition, thus altering the motivating stimulus and in some cases inducing relaxation.

Compensatory activity may take many forms. It has often been pointed out that gait and voice and general manner may betray a personal lack of some sort, as when the undersized man walks in an aggressive manner and speaks in deep tones, when the cowardly boy becomes a bully, or the socially timid child is overtalkative. Much of the play of children is compensatory, as E. S. Robinson has pointed out in two stimulating essays.³ As he says: "The child, living in intimate contact with a world of adults (often too with a world of fiction), develops impulses to behave in manners which he is taught by his parents and by more concrete agencies are not desirable or possible for him. The conflicts thus created remain until they are finally resolved by changes incident upon his own growth and by changes which practical experience creates in his own impulsive nature. But while he is a child, certain conflicts and certain compensatory resolutions of those conflicts remain as integral parts of his child character." The conflict is always be-

³ E. S. Robinson, "The Compensatory Function of Make-Believe Play," *Psychol Rev.*, 1920, 27: 429-439, also "A Concept of Compensation and Its Psychological Setting," *Jour. Abn Psychol*, 1923, 17: 383-394.

tween two impulses—one to do the impossible or forbidden thing, the other to obey the parents or “behave.”

In saying that the compensatory play behavior is such as to “express in modified form all of the essential elements of the conflict,” Robinson implies that the activity in some way affords at least partial biologically direct satisfaction of the motive at the basis of the conflict. In the case of the boy who plays with toy soldiers because he cannot go to the front, we have as the stimulus a desire to fight, the direct “adequate” responses to which would include marching, shooting, becoming very angry, and the like. In his play the boy actually does some of these things, in a partial way; he is vindictive toward the tin soldiers, swaggers and shouts and waves flags, in a way which corresponds to his conception of what going to the front would be like.

Further illustrations from children’s play will indicate how pervasive and important compensatory activity is in children. The five-year-old is always wanting to lift the baby, to rock him, and to play with him. Since these impulses if carried out might have serious consequences, they are consistently nipped in the bud by the parents. To prevent the wailing which might otherwise ensue, wise parents provide all manner of soft cuddly animals and dolls for little children, and if these squeak or talk or move about when wound up, so much the better. On them little children can lavish their affection freely and have good fun without unpleasant frustration.

Children old enough to begin to “help Mother” or “work with Daddy” constantly find their impulses to engage in adult occupations almost completely blocked. They are encouraged to want to help, yet are permitted to do but very little, and that only rarely—as a rule, when the busy parent has plenty of time. Lehman and Witty found that primary school children showed great interest in helping parents. Each of about 1700 children was asked to name the five things that he liked best to do at home, and the five things at school which he liked best to do. A large number of the children reported that they liked to help someone in the performance of certain tasks.⁴

⁴ Harvey C. Lehman and Paul A. Witty, *The Psychology of Play Activities* (Barnes, 1927).

When we consider the extent to which the desire for such activities as those listed must necessarily be thwarted in the early years, we can easily see how directly compensatory much of the common childish imitation of adult activities must be. We can understand the intense interest often shown by little girls in playing with toy tea sets, brooms, washtubs and cookstoves; and by little boys in snow shovels, toy engines, electrical devices, toy agricultural implements and tools. The popularity of mud pies, of home-made paper money, of doll carriages, and of miniature fire trucks is at the same time a reflection of the social environment of the child and an indication of the extent to which his desires to participate in the activities of adult society are checked.

Listening to stories or reading stories provides rich compensation for children of all ages (and for adults), as do of course the moving picture and the acted-out or witnessed drama. The very little child's favorite stories are about such activities as were mentioned in the preceding paragraph.⁵ As his interests broaden so does the range of the child's reading enlarge. Wise teachers may now use the child's spontaneous compositions in the school as an index of his interests. Often they may detect in these stories indications of conflict or hidden desires which the child would not dream of expressing directly. * He is unaware that his stories are so revealing.

Various constructive and æsthetic activities such as block-play, modeling, and drawing have among other functions a compensatory value for the child. A striking illustration is found in the prevalence of "sexy" drawings particularly in pre- or early adolescence. Stern disapproval of such drawings may only intensify the conflict of which they are a natural expression. Less evident compensatory values are to be discerned by understanding adults in æsthetic activities. The author only recently became aware, through noticing repeated queer drawings made by her six-year-old, how intense was the child's desire to see the Statue of Liberty. Seeing the drawing reproduced in Figure 35, the author

⁵ See the *Here and Now Story Book*, Dutton, 1921, with its stimulating introduction by Lucy Sprague Mitchell; also *Another Here and Now Story Book*, Dutton, 1937

asked what it was about. "This is a boat going to the Statue of Liberty," the little girl said. "But what are these?" "Those are people going on the boat, they are so glad that they are doing this!" she answered, jumping up and down as she flung her arms above her head! It was not very long, we may add, before the trip was actually carried out.

While for all children such common play activities as



FIG. 35. COMPENSATORY DRAWING OF A SIX-YEAR-OLD
"A Boat Ride to the Statue of Liberty."

these mentioned above must serve a compensatory function, certain special kinds of play undoubtedly have additional compensatory value for particular individuals or groups, according to the motivation which is peculiar to them. For example, Lehman and Witty believe they have shown by their play quiz as given to children of grade four and above, that playing school may serve as a compensation for a feeling of intellectual inferiority associated with poor progress in school. They found that among over 543 colored children between the ages of eight and eighteen, playing school was very commonly reported, as it was by the white children examined. But the Negro children played school much more frequently than the white children, and the girls of each race more frequently than the boys of that race. The following table furnishes a numerical statement of the situation:

TABLE 6. PERCENTAGES OF WHITE AND OF NEGRO BOYS AND GIRLS WHO INDICATED THAT THEY HAD BEEN "PLAYING SCHOOL" DURING THE COURSE OF ONE WEEK. JANUARY, 1926.*

| <i>Ages</i> | <i>Negro Girls</i> | <i>White Girls</i> | <i>Negro Boys</i> | <i>White Boys</i> |
|-------------|------------------------|------------------------|-----------------------|-----------------------|
| 8½ | 81 | 57 | 41 | 13 |
| 9½ | 61 | 41 | 40 | 9 |
| 10½ | 60 | 43 | 29 | 11 |
| 11½ | 47 | 35 | 21 | 5 |
| 12½ | 41 | 19 | 15 | 3 |
| 13½ | 32 | 9 | 8 | 3 |
| 14½ | 21 | 6 | 2 | 0 |
| 15½ | 21 | 1 | 5 | 0 |

* From *The Psychology of Play Activities*, by Lehman and Witty. (Copyright, 1927, by A. S. Barnes and Company Used by permission)

In interpreting these results, Lehman and Witty call attention to the findings of Witty and Decker that Negro children were educationally retarded in all subjects at all ages as compared with white children. They say that Ne-

gro children are doubtless aware of this inferiority from an early age, and suggest that "Negro children engage in playing school more commonly than white children because this activity symbolizes to them knowledge, power, and prestige, which they are unable to achieve in the world of actuality." The greater participation in this activity of girls as compared with boys is explained by the authors as due simply to greater environmental restrictions.

Lehman and Witty found also that many children reported having gone to church during the past week "just because they wanted to go," and that Negro children attended church more frequently than white children. Their tables show that the Negro children indulge very much more frequently in "playing church" than the white children. The same situation is revealed in figures showing percentages of boys and girls who had "played Sunday school" during the week. According to Lehman and Witty, it is reasonable to suppose that in some instances the Negro's religion is a compensatory mechanism having the same origin as the daydream. While the factors in any such play must be many, and must vary with the player, it seems indeed reasonable to suppose that compensation is an important part of the explanation. Writers have often pointed out that the Negro spirituals which most feelingly emphasize the splendors of heaven and the kindness of God were the product of slaves. Not only in actual church attendance, then, but also in plays which reproduce religious ceremonies, compensatory factors seem to be present.

Another type of overt play, namely games and plays of adventure, demands mention from the point of view of the compensatory theory. It is a fact that human beings like to be stirred, to be thrilled, to feel suspense, even to be in danger. Such emotional responses occur easily, and if there are no serious personal consequences they are enjoyed in process and in retrospect. It was well for the race that the earliest human beings had this zest for adventure, for thrilling and dangerous physical activities were necessary for its survival. Civilized men have the same delight in adventure, and even if they have never faced actually dangerous situations, they often long for the experience. This longing can be explained as the result, among other factors, of powerful

social traditions, tales of strength and heroism which have gained for the doers the applause and the love of multitudes. There is little chance or little need in modern life for strenuous physical adventure. But the urge persists, fostered in every generation by stories of the past and by the incitement of outstanding heroes of the present.

How can this motive be satisfied? One way is by reading, seeing movies, listening to certain radio programs, dreaming. Another is by strenuous overt play in which there is thrill, suspense, the illusion of danger—but always (or nearly always!) safety in the end. All manner of plays and games may help to satisfy the “urge for adventure,” from climbing over the dangerously high poultry house in early childhood, to shooting the chutes or riding on a scenic railway in youth, from venturing as far as the grocery store across the railway tracks in infancy, to taking part in a polar expedition as an adult. Playing Indian, cowboy, or soldier, fighting with snowballs, going off with a scant store of provisions to seek an undiscovered island—all these are common means of expressing in overt play urges for specific types of adventure.

It is apparent that much of the play serving to compensate the child for lack of real adventure could easily shade over into delinquency, and also that the child actor himself might be perfectly innocent of any evil intentions. Jane Addams has argued on a basis of a rich experience with individual cases, that many instances of running away, stealing rides on trains, setting fires, and other such activities may be best understood as essentially natural responses of youth starved for adventure.⁶ With the thirst for adventure as strong as it is in childhood and youth, and opportunities for its actual realization so few, the great social importance of providing plenty of exciting play, both overt and imaginal, is strikingly apparent.

Concrete compensatory play shades off into imaginal play activities. In much of the overt play which we have cited as illustrations of compensation, imaginal factors are, of course, important. Play which is predominantly or wholly imaginal we may call fantasy.

It is clear that in imaginal play children have a quick and

⁶ Jane Addams, *The Spirit of Youth and the City Streets*, Macmillan, 1910, chap 3, “The Quest for Adventure”

easy means of compensating for thwarted motives; and easy to see that the theory of Robinson is particularly applicable to pleasant imaginings, whether in dramatic plays or stories, in dreams, or in daydreams. The main function of the daydreamed imaginary companion or companions is obvious.⁷ The foster-child fantasy, in which an own child repeatedly daydreams that he is really an adopted child, is far more common than most people or even most psychologists imagine. In a study of several hundred subjects with regard to this fantasy, the author finds that the percentage of high school and college students who at one time or another have entertained it is not far from fifty.⁸ The motivation of the fantasy is clearly far from simple. Sometimes the child dreams he is actually of high or noble birth, but adopted by an inferior family—a theory consonant with Freudian views.⁹ But not infrequently in his dream a child imagines a humble origin for himself, and thus explains the loving care he is getting or would like to get. But whatever the motivation, compensatory factors are likely to be evident.

At first sight it is not so easy to see how the theory applies to unpleasant imaginal activity, but analysis of such activity indicates that it does. We may cite an unpleasant dream as an illustration.

A small boy dreams that his little sister is killed by an automobile, and that the whole family is overcome by grief. This boy has been at times secretly jealous of the sister since her arrival, and has felt at such times that his adored mother no longer loves him. When he is in such a mood as this, the unrecognized jealousy motive is dominant and creates a serious problem, since any impulses against the sister are checked in his rational thought. But when he is thinking of her as dead the mental conflict is less serious, since this sort of thinking actually accords with certain subconscious impulses, and permits unimpeded thoughts of mother love as

⁷ See N. A. Harvey, *Imaginary Playmates and Other Mental Phenomena of Children*, Michigan State Normal College, Ypsilanti, 1918; also E. B. Hurlock and M. Burstein, "The Imaginary Playmate. A Questionnaire Study," *Ped. Sem. & J. Genet. Psych.*, 1932, 41: 380-392; M. Svendsen, "Children's Imaginary Companions," *Arch. Neur. Psychiat.*, 1934, 32: 985-999.

⁸ M. W. Curti's "A Statistical Study of the Foster-child Fantasy," to be published. See E. S. Conklin, "The Foster-child Fantasy," *Amer. Jour. Psychol.*, 1920, 31, p. 59.

⁹ Otto Rank, *The Myth of the Birth of the Hero*, Nerv. & Mental Dis. Publ., 1914.

now directed wholly toward him. Thus the dream activity, although subjectively unpleasant, does afford a measure of objective satisfaction of a desire, perhaps subconscious, to have his sister out of the way, and hence comes with all the effortlessness of pleasant play activity.

The same statement is often true of morbid daydreams in which through imaginings of suffering or death the child gets the attention, sympathy, and love which he craves in actual life but does not receive. The illustration suggests also how it may be possible to regard as in part compensatory the reading of sad or tragic literature, and the enjoyment of other forms of tragedy in art—in painting, sculpture, and the drama.

Substitution.—One indirect means of providing satisfaction is through the substitution of other motives which, for the time being at least, prove stronger than the original motive and hence dominate the activity of the individual in its place. This principle is illustrated in the common advice to parents, that if they forbid the continuation of an activity in which the child is engaged, or take something away from him, they should try to get him interested, at once, in something else. The four-year-old engaged in pulling up pansies in the garden may be induced instead to play happily in the sandpile. Dr. Healy and his associates have found through careful follow-up study that in certain cases delinquent boys and girls whose minds were obsessed by sex, have in a surprisingly short time developed healthy interests in normal work and play when placed in foster families where varied and stimulating activities were the rule.¹⁰ A change from city to farm life or vice versa, a radical change of school or occupation or home environment, has often proved very effective. Usually, of course, it is not merely the physical environment that is altered, but the social environment also; and new ideas, hopes, and plans, new personal pride, enter in as important parts of the changed motivating situations.

Sometimes the method of adjustment by substituting other more desirable activities for those induced by the original motive is thought of as a process of "sublimation," or a drafting of the original energy into new channels. Accord-

¹⁰ W. Healy, A. F. Bronner, E. M. H. Baylor, and J. P. Murphy, *Reconstructing Behavior in Youth*, Knopf, 1929, 40-56.

ing to this Freudian view, the sex delinquent who becomes absorbed in the work of the farm is actually expending sexual energy in the farm work and the boisterous wrestling and other amusements indulged in there. Such a theory is not at all explicable in terms of our conception of motivation, for a motive is not regarded as a store of energy, or a general reservoir of force, which can be directed through one channel or another. It is instead a definite stimulating situation, and if it ceases to dominate behavior, as in this case, it is only because more powerful stimuli now affect the organism. And as Woodworth says, the new activities which are engaged in soon come to furnish drives (motives) in their own right.

Substitution, although a very important means of dealing with childhood problems, will not apply to all, and is often of merely partial or temporary value where it does work. The delinquent boy on the farm, for example, while much better adjusted in general, is still bound to be affected by sex stimulation at intervals, and some other sort of adjustment will have to be made.¹¹

Substitute play activities of various kinds are important modes of indirect satisfaction. Some physiological motives even, if direct satisfaction is not possible, may be indirectly satisfied for a while through substitute play. Pain and other organic stimuli connected with illness are directly satisfied, of course, only through the clearing up of the organic condition. Invalids, however, often make fairly good adjustments by cultivating an interest in reading, writing, or other types of recreation. Robert Louis Stevenson affords a classic adult example. Had his stories dealt largely with white-linen nurses and kindly doctors they would have represented compensatory play. But *Travels with a Donkey* and *Treasure Island*, although they doubtless afforded compensation to the author for some of his needs, are with respect to the organic pain motive distinctly a substitute type of response. Children who are ill or cripples are encouraged to take an interest in other things than their troubles; and games and happy work go a long way toward relieving the stress of the situation. In such cases the pain stimuli

¹¹ See W. S. Taylor, "Critique of Sublimation in Males: A Study of Forty Superior Single Men," *Genet. Psych. Monogr.*, 1933, 13, No. 1.

are not mysteriously expressed and got rid of in play—it is simply that for the time being other motives come to dominate.

Hunger affords a good example of a motive which it is impossible except momentarily to satisfy through substitute play. Hungry children may indulge in boisterous play which for a time “takes their minds off their troubles.” So insistent is the hunger stimulus, however, that the substitution provides only brief satisfaction; and even while the play is going on, compensatory fantasies of good things to eat are more than likely to occur.

Sex is a physiological motive for which substitute satisfaction in play may be much more effective than in the case of pain and hunger, because sex stimulation is not so continuous as these, nor is direct satisfaction necessary for the survival of the individual. The lovelorn high school boy who plunges into athletics, the girl who becomes unnaturally absorbed in her studies, the moody adolescent who becomes an ardent radio fan—all these may find some inner satisfaction and also appear outwardly adjusted for long periods of time, although through the activities mentioned there may be no direct sex expression whatever. Such indirect expression as indulgence in novel reading and other compensatory waking behavior may be absent during much of the time, although it tends to recur. It seems probable, however, that related compensatory activity of some sort is essential to effective personal adjustment. The point here made is merely that substitute play is also a factor, though perhaps a minor one, in resolving the conflicts between sex impulses and the desire to be moral, conflicts which are prevalent and important in adolescence if not at other times.

So many eager interests do children have and acquire, so many things do they want to do, that, as Robinson says, their impulses are constantly being thwarted. It is probably true that for most of these unexpressed wants no directly compensatory activity occurs. Adults commonly take advantage of this multiplicity of childish interests, by deliberately substituting one interesting activity for another. A baby has seen the children next door playing in their garden swing, and struggles to get out to join them. The tactful parent tries one thing after another to prevent the inconvenient ac-

tion. Mere verbal appeal is useless, and physical restraint will produce an emotional outburst, but the production of a pretty picture book with a promise to read a story, or the putting on of a favorite phonograph record, may produce magical results. In the case of an older child whose heart has been set on attending a picnic which it now appears will not take place, an afternoon of sulking may be prevented by permitting a visit to the movies with a companion. Probably, however, it is as a means of adjusting to the more temporary and less deeply fixated motives of children that substitute play is most successful.

As a mode of resolving conflicts, substitute play really corresponds to what in contemporary critical thought is called "escape." When the physician advises his nervous patient to take a vacation in the pine woods, or when anxious parents ship their lovelorn offspring off to Europe or send them to a Y.M. or Y.W. camp in the hope of curing the trouble, quite literal escape is sought. But the troubled person who is unable to travel may find satisfaction through a book, in a mental flight to the South Sea Islands. The discontented housewife may neglect her work to find solace in romantic novels of the Middle Ages. It has been suggested that much of adult religion and pseudo-philosophy represents, fundamentally, an escape. The problems of the workaday world being too difficult to face, they are avoided by taking refuge in another world, a world of thought which affords pleasant solutions of perplexing problems. The mechanism of escape may underlie the absorption of children in impossibly romantic tales of other times and other lands, and especially in fairy tales.

A discussion of the psychological effects of Christian Science, New Thought, or even Platonic Idealism would be out of place in this book. But the opposition of modern critics to the "philosophy of escape," may lead us to question to what extent substitute play, whether overt or implicit, is effective and desirable in the mental adjustments of the child. The question is an important one, both theoretically and practically. The Freudians and some orthodox psychologists would have us believe that even such a strong physiological motive as sex may be adequately expressed by "diverting the sex energy into other channels"; and guardians

of the young often act on the assumption that athletics, travel, hard work, or religion, or a combination of these, will adequately resolve a serious childhood conflict. But we have seen reason in the preceding chapter to question the soundness of the general doctrine of sublimation which is implied in these attitudes; and we may now point out some of the limitations of substitute play as satisfying activity.

The main point to be made is that, since substitute play satisfies a motive only in the objective sense of ending its dominance by *avoiding* it, the original motivating stimulus at the basis of the conflict remains unadjusted to or "unexpressed." If, with the Freudians, we conceived of the original motive as a general reservoir of energy which could flow out through various channels; or if with certain *gestalt* psychologists we thought of the condition in general terms as a psychic tension to be relieved, then it might seem reasonable that the substitute activity would minister directly to the original need. But it is clear that substitute responses could not change a motivating stimulus to which they are not directly related. For this reason, it would seem that substitution can seldom, in a conflict situation, be anything but a merely temporary or partial or compromise means of adjustment, unless perhaps the original need is transient.

The limitations of substitute play are perhaps most clearly illustrated in sex conflicts. Not merely clinical experience with neurotic subjects, but also the observation of the behavior of perfectly normal children and adults, indicates that the attempt to satisfy an awakened sex urge by entirely non-sexual substitute activities, is likely to bring results nothing short of disastrous to the child. In cases in which there is no overt sex behavior, and "no interest in sex"—no association with members of the opposite sex in play, no novel reading or talk or questions about sex—investigation seems to show a good deal of hidden sex behavior. Sexual dreaming and daydreaming may be extensive though concealed by the child, and masturbation of some sort is exceedingly common. In many cases there is overcompensatory behavior shown in prudishness or ardent idealism, behavior which is possibly an extreme form of substitute satisfaction.

All of this indicates that a child who is maturing or is mature sexually, and who seems to be trying to "sublimate," is

in need of help. It is not clear that direct biological expression of any sort is essential to normal adjustment. But indirectly "satisfying" activities are essential. Of great value in adjustment are compensatory play activities, such as the reading of novels and plays which deal in a frank and wholesome way with sex themes. "Idealistic" works of art which ignore sex entirely, or which deal with it in a figurative, romantic, or distorted way, are to be condemned on psychological grounds not only as failing to satisfy sex curiosity and as thus helping to keep it alive, but also as tending to prevent adjustment through suggesting false beliefs. The same general point may be made about a common type of pamphlets and books designed for the instruction of youth in sex matters. Social games involving association with members of the opposite sex, and general association of boys and girls in common enterprises, are important means of controlling sex behavior. Besides forms of play, adequate adjustment is also furthered by, in fact is sometimes impossible without, objective thinking and reasoning about the whole subject. If all these means of adjustment could be honestly tried, much of the storm and stress of adolescence might be avoided.¹² As one still-troubled adolescent put it, instead of being a time of struggle and disillusionment, adolescence might be a period filled with the rush of new life and the broadening of new horizons.

We may take one more case to illustrate the limitations of substitute play. In the case of grief over the loss of a loved one, there is a tendency to respond directly by weeping or by continual dwelling on thoughts of the departed. An overcompensatory adjustment may take the form of an extreme idealization of the beloved person, of excessive daydreams about his present happiness in another world, or of fantasies of his return. The maladaptive character of these adjustments needs no emphasis. There is considerable question even as to the wisdom of the advice to cry it out. In the case of grief substitute play might seem to be demanded, and if it ever constitutes an adequate type of adaptation we

¹² Leta S. Hollingworth's *Psychology of Adolescence*, Appleton, 1928, is a stimulating and constructive treatment of the major problems of adolescence. See also M. W. Dennett, *The Sex Education of Children*, Vanguard, 1931, and Karl de Schweinitz, *Growing Up*, Macmillan, 1928.

might expect it to do so here. Certainly the value of persistent cultivation of new interests, and a change of scene and of occupation, is apparent. Instead of reading which reminds him of his loss, the subject may be encouraged to indulge in optimistic and bracing literature, and to avoid tragic drama. Such "play," in addition to the work which is of course indispensable, might be thought sufficient.

But however useful these aids may be in temporary adjustment, if the loss is serious, grief cannot be permanently assuaged by such means. Again the real problem has been avoided, the basic motivating stimulus unadjusted to. If the individual is to be "satisfied," that is, adapted with respect to the situation, the whole problem must be faced and some adequate direct adjustment thought out. While calm and objective reasoning is probably a *sine qua non* of really adequate adjustment, certain forms of play activity may be a most valuable aid. Tragic drama may do more than allow some physical outlet in tensed muscles and in tears. The tragedy which is a representation of life and which yet adds to one's sense of the beauty and meaning of life, may be for some people far more adequate as means of adjustment than taking solace in substitute satisfactions.

When either substitute or compensatory behavior of an implicit character is consistently indulged in, it is called introversion; that is, the child unconsciously seeks inner imaginary satisfactions to make up for continuing needs. In day and nightdreams, through reading and the movie and the theater, children may enjoy all manner of interesting experiences, and obtain a measure of satisfaction for some of their deepest needs.

Rationalization.—A third indirect means of adjustment to motives is through rationalization. This is thinking which occurs in response to a demand that conduct shall be consistent and logical, and it consists in giving an apparently reasonable but actually distorted explanation of an act already committed or a state of affairs already in existence. Since, as Piaget has shown, the ordinary child feels no special need for logical consistency before the age of eight or so, we shall expect this type of thinking to be less common in young children than in middle childhood, and to be universal in adults. That it is universal in adults any student may discover, with

profit to himself, both through introspection and through observation of the thinking of others. Although careful studies of rationalization in children are lacking, observation reveals its presence as an important mechanism in later childhood. An illustration is the case of the boy who, brought up in proud isolation and educated by tutors, was painfully shy and had great difficulty as both child and adult in making social adjustments. When he finally went to a public high school he excelled in scholarship and, although bitterly lonely, he rationalized by cultivating a worship of solitude. He was entirely unconscious of the real motive which doubtless lay back of his fondness for the poem beginning "There is a rapture in the lonely woods. . ." His desire for companionship and appreciation, thwarted, left him with an aching loneliness which became more endurable through this rationalization.

Rationalizing is illustrated in the "Pollyanna attitude" and the sour-grapes device. We may add to these well known types of rationalization another, "the spilt milk delusion." An older child known to the writer frequently made awkward mistakes in her work about the house. Anxious to be efficient, she developed the habit of consoling herself by such thoughts as these, "Maybe it's just as well that I did spill the milk all over my new dress; it will teach me to be more careful next time." Moreover she applied the same "reasoning" to moral lapses. The habit of rationalizing in such ways is sometimes deliberately fostered in children as a desirably optimistic type of adjustment. But in so far as it leads to the ignoring of important factors in life situations, and thus tends to interfere with the working out of more effective adjustments, it is undesirable and should certainly be discouraged.

The combination of habitual rationalization with excessive introversion, to the neglect of useful overt accomplishment, actually threatens the mental health of the child. The disappointed spinster school teacher, who, having failed in her personal life and in her work, has taken final refuge in a world of daydreams in which she is the Queen of England, was once a lonely and disappointed child — a child who turned to imaginary satisfaction in her play. As an adoles-

cent girl she explained her isolation as due to a great love of books, and incompatibility with the rude children of common people; and she attributed her unpopularity at school to jealousy of her superior intellect. Similarly now, as an adult, utilizing unconsciously the same mechanism, does she account for her position in the asylum — she was persecuted by colleagues who were jealous of her, she thinks, and was finally taken to the hospital under false pretenses, as a way of removing a formidable rival.

This case, studied by the writer, represents of course a very unusual outcome. But abnormal adjustments of this sort represent merely exaggerations of normal maladjustment, and there are all degrees of abnormality. Any habit of adjustment which involves the minimizing of important problems or the substitution of imagined for actually needed overt adjustment is likely to result in some degree of weakness in the personality of the child.

Hysteria.— Under a fourth heading, hysterical manifestations, we may classify all those modes of response in which an oppressive situation is avoided by physical symptoms which prevent action. An illustration is the case of the little girl who on her way to school on examination day becomes sick at her stomach, vomits, and has to stay at home for the rest of the day. On a later day she walks to school dreading the arithmetic hour, when she will be asked to go to the blackboard and may be assigned a problem which she does not understand. A feeling of faintness comes over her and finally she is so sick that she has to go home again. Such a child may miss many lessons through illness, and, especially if solicitously watched over by an anxious mother, may become a delicate child and a hypochondriacal adult. The spells of sickness have become fixated as an effective solution of any too difficult problem, when the dread of failure constitutes a strong motivating stimulus.

The mistake is often made by physicians and laymen of assuming that in such a case the child consciously adopts this method as a way out. Dr. George K. Pratt, for example, in commenting on a particular case, says that the little girl on the second occasion first *remembers* the vomiting at an earlier time, and then reasons that if she becomes sick now, she

will escape the arithmetic hour. It is only after the response has become habitual, according to him, that she forgets its origin, so that it now occurs unconsciously.¹³

But though true of some cases, for many, probably most others, this explanation is misleading and false to the facts as disclosed in clinical study. We have here an example of learning occurring on the principle of the conditioned response. There is associated with the original intraorganic stimulus which induced the vomiting, the complex situation of going along the walk toward the schoolhouse and thinking, "I shall fail." On the second occasion, the mere bodily position and sight of familiar objects along the route, plus the stimulus involved in the thought of failure (for every idea, as a response, involves a stimulus), is sufficient to elicit the response. We should expect the response (including nausea and incipient vomiting) to follow directly upon the stimulus without any intermediary conscious thought.

Study of actual cases of this type indicates that often there is no intermediary thinking about the factors in the situation; frequently the subject never does realize the true nature of the case. In the examination of a patient who for the sake of understanding the origin of a maladjustment is induced to recall related events, the physical symptoms often occur before the patient remembers the actual situation. Then related images and trains of thought come back. Trained adults who have observed themselves at the time of the first recurrence of a conditioned bodily reaction of this sort report that they become aware of the bodily reaction before they "have any idea of the reason for it." For example, a well-balanced college student who had lately recovered from a severe major operation, suddenly, to his surprise, felt limp and nauseated as he entered a popular quick-lunch room for his breakfast. It was some time before the reason for the reaction occurred to him. The shining enameled tables of the lunch room were like the tables in the operating room, and served as a substitute stimulus for the ether in eliciting the nausea and bodily relaxation. In children, then, hysterical responses are likely to be fixated unconsciously, and are retained not because of intelligent decision but because, like the chance successes in animal learning, they

¹³ George K. Pratt, *Your Mind and You*, Funk & Wagnalls, 1924, 34-35.

function to relieve underlying motives in a problematic situation.

The symptoms of almost any organic illness or disability may become fixated as solutions of conflicts in much the same way as indicated in the case of vomiting. The author once observed an attractive young girl who was the oldest girl in a large family, and had worked so incessantly to keep the family going that she had no social life of her own until she became paralyzed and got to the hospital, where she was a favorite patient. The paralysis was easily diagnosed as functional, or psychological in origin. A boy of high school age, known to the author, suffered at times from complete loss of voice. Inquiry disclosed a most difficult family situation, with violent quarrels in which the boy, torn between sympathy for his mother and a sense of duty to his father, was appealed to by both for support. Physicians were unable to locate any organic causes. A motherless little girl who has spent a good deal of her life in temporary foster homes is now, at eight, nervously anxious about her health, and "is always getting sick spells" so that the doctor, a jolly fatherly person, has to be called, and the foster-mother or matron of the home where she happens to be must give her special attention.

Such hysterical trends as these very often get their start in childhood and remain in adults as fixed modes of satisfying motives. The milder types are very common, and every physician has to deal with patients whose troubles are really psychological. There is a tendency to dismiss these troubles as "imaginary," and to suspect the patient of shamming. Such an attitude is usually unjustified. The trouble, however caused, is real — conditioned nausea and vomiting are, after all, nausea and vomiting, a set of responses to be reckoned with. Moreover, when we realize the unconscious origin of such conditioning, and consider that the patient's situation was exactly comparable to that of an animal in a trap which simply takes the most available way out, we see how superficial the verdict of shamming may be.

For the student of child psychology the most significant point about these hysterical manifestations when they occur in adults is that they are very likely to have a history extending back into childhood. Therefore the importance of pre-

vention is clear — and this implies providing opportunities for the normally healthy satisfaction of childhood motives. Since these are in many ways different from those of adults, parents must make a special study of children in general, and of their own children in particular, to the end that they may know their most pressing needs. If hysterical trends are already established in a child, the general procedure to be followed is clear, though the details of application may in some cases be very difficult. It stands to reason that the earlier the treatment is begun the greater the chance of success, since year by year the maladaptive response becomes more deeply fixated. In order to effect a cure the original motivating need should if possible be discovered, together with the nature of the conditions which gave rise to the hysterical indirect solution. Then there must be "reëducation," with new motivation provided or new means utilized for satisfying the old motives.¹⁴

Reasoning.— This leads us to a final indirect means of adjustment to thwarted motives, namely, reasoning. If the problem be an intellectual one, such as the problem of finding out how much money it would take to buy two dozen cookies costing three cents each, or of accounting for the origin of the wind; or the necessity of deciding whether to prepare for engineering or for a business career, then reasoning, or the attainment of a solution which answers the question, is of course the adequate and direct means of adjustment. But in case the underlying motive is one which can be fully satisfied only by some special bodily adjustment, either of the skeletal or visceral type or of both, then reasoning is only a partial or indirect adjustment.

To illustrate, a child of six begs to be allowed to wear out to play the new dress which her grandmother has sent her. The mother urges her to keep it clean until Sunday, when grandmother is coming to visit. The little girl, to whom Sunday is a long way off, insists, until her mother explains how hurt the dear grandmother will be, asks if she wants to make her happy, and explains why the dress will not be so pretty after it is washed. Finally the child realizes in imagination the bad consequences of wearing the dress now, and

¹⁴ A good book on the mental hygiene of childhood is C. M. Loutitt, *Clinical Psychology*.

adopts as a solution the plan of waiting until Sunday to please the grandmother. After that there is no longer a problem. If the wish to wear the dress recurs, the child at once recalls her decision, and is satisfied — that is, the decision leads her to turn to other activities so that the wish is not dominant.

It is probably true that the older a child grows the more must he become accustomed to being satisfied with what we may call "ideational adjustments." Some desirable solution is worked out which can be realized later, or only gradually, but meanwhile this symbolic solution prevents undue mental stress or conflict, because, once acquired, it recurs readily as the most natural response to the motivating situation.

Sometimes, often in fact, the result of reasoning about a problematic situation is the conclusion that the underlying motive may never be directly satisfied, and perhaps cannot be. In that case the symbolic adjustment must be the permanent one. The little girl's wish to be a boy may serve as an example. One young woman known to the author was, as a child, dominated for years by this desire. As a very little girl she thought the possibility was a real one, which could be met by dressing and acting like a boy. When she really understood the physical impossibility, she was much depressed, as her parents, having wanted a boy, were always calling her their little boy, and praising her for her strength. Through the help of her parents she might have been able to face this really difficult situation rationally. On different occasions she might have been made to see that girls may be strong and brave, just as boys can be, and that it isn't the clothes or the manner which is most important, but what a person does and how he thinks. The good points of little girls she knew might have been pointed out to her, and also, certain lacks in boys. The point might have been made that her mother, whom she loved, was once a little girl like herself. Thus a rational decision to be a happy little girl and not worry about the matter might have been reached, as it has been in other cases, and the undesirable motivation thus controlled. In this particular case the parents continued their unfortunate attitude, and the problematic situation became a conflict, greatly influencing the development of the child's personality. Now a student in a coeducational col-

lege, she dresses in a masculine way, is loud spoken and aggressive, and is so definitely homosexual in her emotional attachments that she fears (needlessly, the author believes, if proper steps are taken) that a normal married life will be impossible for her.

This case illustrates the great importance of ideational adjustments made after the subject has carried out as complete a rational survey of the situation as possible. Ideational adjustments may provide temporary solutions until circumstances are such that they can issue into direct action; or in case that is impossible, they may serve as a permanent means of adjustment. In many cases merely talking the matter over with someone else older or wiser is frequently effective in ending the dominance of a motive, especially for children who so often lack the experience and wisdom necessary for arriving at an adequate and satisfying explanation. Thinking about a need in a calm complete way involves some measure of adjustment to that need: one cannot at the same time be thinking about the reason for it and what it means and what should be done; and also be reacting in a disruptingly emotional way, or daydreaming an imaginary satisfaction, or reacting by distressing physical symptoms, or resting content with a falsely comforting explanation.

It is one thing, however, to advise calm thinking, and another to do it consistently. Even distressed adults find a merely rational attack impossible, in some situations, and if a direct attack cannot be made on the disrupting motivation (if, for example, food or warmth or a loved companion cannot be provided) then, usually, some kind of aid from other people in the form of active sympathy and other non-intellectual modes of substitute adjustment is needed. Too often reasoning means rationalizing, and adjustment means resignation to a condition which should be changed. In helping children to adjust to distressing situations there is often danger, in the author's opinion, of placing too great a mental strain on the child. Certainly he should be encouraged to form the habit of seeing problems and of facing them squarely. But as he makes what Hart calls "the fight to a finish" in any situation which for him is serious, he needs more than wise counsel: he needs the love of another person.

If toward the last of this chapter we have dwelt on means

of solving conflicts rather than of solving problems, it is not because we believe that childhood is conflict-ridden. We do not agree with Bertrand Russell that childhood is a necessarily unhappy period of life. On the contrary, given even a half-way normal environment and the average amount of freedom and of parental love, normal children are seen to meet most of the varied problems they encounter with wide-eyed interest and often with refreshing zest. Children love to play, and while they are still children, they love to work. Perhaps the society of the future will enable more of them to retain through life their childish love of solving problems, their delight in work as well as play.

SUGGESTIONS FOR READING

Books which contain excellent case studies illustrating behavior in problem and conflict situations are Mary B. Sayles' *The Problem Child at Home* and Foster and Anderson's *One Hundred Problem Children* . . . A book which shows in a most stimulating way some of the possibilities of the control of "problem children" is *Reconstructing Behavior in Youth*, by Healy, Bronner, Baylor, and Murphy. It is fascinating reading . . . Margaret Mead's *Coming of Age in Samoa* is a very interesting book dealing with the adolescent girl in Samoa, her problems, and her supposed lack of conflicts. Frankwood Williams saw a similar lack of conflict in Soviet Russia, as reported in his book *Youth in Russia*. The author wonders whether either Mead or Williams really got far beneath the surface . . . Bertrand Russell's *Education and the Good Life*, Boni & Livright, 1926, is a provocative book for parents.

CHAPTER XIV

SOME FACTORS IN THE GENESIS AND CONTROL OF SOCIAL AND ETHICAL BEHAVIOR

IN THE psychology of fifty years ago, which was based largely on the observation of adults, many forms of social and ethical behavior were regarded as instinctive. This type of theory still prevails in popular, even in educated thought. According to this theory, instincts considered as determining social behavior and social attitudes include, on the positive side, gregariousness and parental, filial, and conjugal love; on the negative side, race antagonism and instincts of competition and pugnacity.

Today, although we find survivals of these beliefs in psychological or near-psychological circles — as, for example, among the Freudians — these too easy explanations of social behavior are not current among psychologists. The reasons why they have largely been given up will be clear after a consideration of the way in which some types of social behavior are actually observed to develop in young children. A general analysis of the factors in the development of definitely anti-social or delinquent behavior will also be illuminating.

THE GENESIS OF SOCIAL BEHAVIOR

Family Attachments and Attitudes. — In our society the first social behavior develops in the family group. The first attachments to other people probably develop on a conditioned response basis. We may illustrate with a specific response, namely, smiling. In the first few weeks, a certain baby smiled only when stroked or patted; or when in the bath, in response to similar stimulation of "sensitive zones"; after feeding, in reflex response to intraorganic stimuli; or finally when her clothing was taken off and she was allowed to stretch and kick (again responses chiefly to intraorganic stimuli). Now while feeding and caressing the baby, the

mother habitually smiled and "talked" to her in tones rather higher than usual.

On the day after the infant was two months old, the mother noticed for the first time that she smiled at once when spoken to, before a move was made to take off the covers. After that the mother could usually produce a smile by her voice alone or by smiling.

This mode of social response, smiling at the smile of another person, has been found to appear in other babies at about the same age.¹ It is clearly a simple type of learning, learning which occurs without rational analysis on the part of the learner, and which fixates a type of immediate response to other people which will be very important in the child's later social adaptations.

In the twelfth week it was noticed for the first time that the baby smiled readily when her mother, neither bending nor talking, looked at her. This is the beginning of the recognition of faces. In it we observe a reflex emotional response called out by a complex stimulating situation which was formerly inadequate to produce the response.

Notes on the behavior of the same baby during the nineteenth week indicate definite progress in the development of emotional attachments. Up to this time the baby's father had taken practically no direct care of her, and she paid little attention to him. The notes for June 29 say, "Father spoke to her repeatedly in bassinet before feeding — she wouldn't smile. Did readily when mother spoke." For the next five days the father, for special reasons, took a good deal of care of the baby, particularly on the last two of these days when her nurse was away. He said that, having been impressed with the fact that she did not seem to "know" him, he made a special point of talking to the child while playing with her and caressing her. For July 3 the notes read, "This afternoon while she was lying on the couch her father spoke to her. She at once looked at him and smiled, and repeated this on more talking. He did not meanwhile make a move to pet her. Father said she had done the same in the morn-

¹ M. C. Jones, "The Development of Early Behavior Patterns in Young Children," *Ped. Sem. & J. Genet. Psychol.*, 1926, 33 : 537-585 ; R. W. Washburn, "A Study of the Smiling and Laughing of Infants in the First Year of Life," *Genet. Psychol. Monogr.*, 1929, 6 : 397-537.

ing for the first time." It seems entirely probable that the experience of the last few days had completed the process of conditioning to the father's voice, and perhaps to the sight of his face.

Later as the baby learns to react differentially to more complex patterns of stimuli (that is, when it learns to distinguish different faces), positive emotional responses are most readily and frequently made to those persons who most often feed, bathe, and play with the baby. Thus a little boy, observed by the writer at the age of eleven months, responded much more affectionately to his nurse than to his busy mother or to his aunt. Why does the baby usually love the mother best? Because it is she who feeds him, plays with him, and caresses him most. At the same time the baby is learning to love the mother, she is also learning to love the baby. Why is the mother more devoted to the baby than the father? Is it because of the "maternal instinct"? No, it is because she herself, through constant care of the child, has become conditioned so that the touch of the little lips or fingers, the smile, and the voice of the child awaken definite emotional responses. These repeated experiences result in a gradually increasing attachment for the baby, and this attachment, along with the ideational responses which she has learned to make in such a situation, constitute her mother love.

Thus mother love, far from being a blind "instinct," is really a complex sentiment founded upon a rich personal experience. In civilized women it involves acquired memories, hopes, plans, and ideals which make the mother's attitude toward her child one of the most significant factors in human progress. The conditions met by every mother are such as would lead in nearly all to warm love, but the universality of the "conditioning" is no proof of its inherited character. Inquiry among educated women who report their feelings frankly indicates that they do not feel a rush of love as soon as they gaze upon their first-born, but that instead they find that deep love develops gradually. A second baby is apt to be "loved even before it is born," the previous experience having so conditioned the mother that she responds to many associated stimuli with pleasurable emotion. If this theory of emotional conditioning holds good, we should ex-

pect reciprocal love between father and baby to develop in proportion to the amount of loving attention given by the father. This seems actually to be the case.

The principle of the conditioned response as applied to emotions is especially helpful in explaining "infantile fixations." In the love of the baby for the parents, and the later childhood love, there seems at present to be no reason for assuming a sexual element, if we define sex behavior as that involving either stimulation of, or response in, the sex organs. This childish love, although strong, may be a matter essentially of sensitive zone stimulation, involving the functioning in conditioning of other stimulating situations (voice, appearance, and the like) for the original contact-stimulation of these areas.

The love of parents for the baby, however, we might expect to be from the first partly sexual in character, since the parent has long been so conditioned that stimulation of sensitive zones calls out implicit sex responses (the basis of the emotion of love) in addition to the positive native responses to such stimulation (cf. p. 118). Especially if either parent is sexually unsatisfied, and hence peculiarly likely to respond sexually, we might expect to find a sexual component in the love response toward the baby. Yet it is reasonable to suppose that the chief basis of parental love consists of the milder affective responses constituting "the tender emotion," responses not sexual at all. It may be urged that the child needs enough caressing to insure normal emotional development, but that an excessive amount may result in too deep an attachment, a conditioning or fixation which may be difficult or impossible to "cure" when the child grows up.

While the foregoing analysis implies the fundamental importance of early emotional experiences in the development of the child mind, it is very different from the Freudian theory. Sex is here considered to play a very minor rôle in the behavior of infants. The special devotion of a little girl to her father, or of a boy to his mother, is not explained on the basis of a sex feeling for the parent, but as the result of an unusual amount of petting bestowed by the parent. It is the parent, with adult habits and interests, who determines the fixation. The parent, not the child, has the sex feeling. Later, especially at the approach of puberty, with new sex re-

sponses appearing, we might expect a child so conditioned to develop some sex feeling also toward the parent in question. But there is no inherent reason, according to the present analysis, why a girl should not develop a fixation for her mother as well as for her father. It seems to be conditions prevailing in the home life, not blind inherent forces, which are the chief determinants of the emotional attachments of the child.

Just as positive emotional responses to people may be conditioned in young children, so also of course may negative responses. A father who often speaks to a young child in a loud gruff voice, or punishes him by spanking or by the use of a stick, may arouse a shrinking type of fear response. This may become so associated with the father that the child, even when the father is caressing him, may exhibit a timid, shrinking manner. Perhaps in the awe, veneration, or respect with which such a parent may later be regarded we have confused remnants of such early conditioning. Not infrequently the early attitude persists. Many a child does not learn really to love a stern parent until old enough to appreciate the significance of the situation, or perhaps never does acquire such love.

The Raw Materials of Social Behavior.—The foregoing rather simplified analysis of the development of family attachments, with its suggestion of the abiding motivations involved, the deeply based and widely ramifying sentiments, may be applied in an analysis of the origin of social responses in general. Indeed it is clear that the early-fixated social responses to the family must be part of the raw material, to use Gordon Allport's phrase, for the development of other types of social behavior.

The baby is equipped with a good many native ways of acting and of feeling (smiling, cuddling, cooing, patting, and the like) which are important factors in the development of positive modes of social behavior. He is also equipped with many instinctive ways of acting and of feeling (crying, pushing, hitting, being afraid in various types of situations and the like) which are potential factors in the development of negative modes of social behavior, of unsocial or antisocial traits.

In the extent to which these native ways are manifest

there are wide individual differences. Some babies naturally smile a great deal, some very much less. Some seem to acquire new positive attachments very readily, some less easily (intelligence may be a factor here). On the negative side some children cry more than the average; some seem to learn to hit others in new situations more readily than most, some are simply much less active than others.

These individual differences in the extent to which native positive or negative endowments are manifested are doubtless in many cases due to differences in heredity, very likely in many cases to hereditary differences in glandular functioning. They are doubtless often due, also, to differences of environmental origin—differences in health (vitality) or ease of manner or confidence. Or, they may be due to differences in the amount and manner of parental care in early childhood. But whether such early appearing individual differences are based on hereditary or environmental conditions, they are certainly important for the development of social behavior.

Now the social traits and attitudes which are valued in a particular society or a particular social group within that society take form in the actual processes of social experience. We may illustrate this by brief statements of some of the factors in the development of the traits of competitiveness or rivalry and of sympathy.

The Development of Competitiveness.—In early babyhood, of course, there is no competitive behavior, for competition means striving to excel another person, to do something in a bigger or a better way than he does. And since the little baby does not even think of himself as a person or recognize others as people, he can engage in no such striving. He is non-social. But very soon parents may observe ways of acting that are factors in the later development of genuine competitiveness. Little babies, after they have begun to reach and grasp, often take things from other babies. Dr. Charlotte Bühler made an interesting study of the behavior of babies placed in pairs in a crib.² To one of the pair the experimenter would present a toy. As any parent might predict, she found no battles for the toy in the first half-

² Charlotte Bühler, "Die ersten sozialen Verhaltensweisen des Kindes," *Quell. und Stud. zur Jugendkunde*, No. 5, Jena, 1927.

year. The baby who receives nothing is satisfied to look on; the baby from whom another takes a toy merely looks wonderingly. During the second half-year, however, many of the babies vigorously resisted the grabbing of their toys, and some were decidedly aggressive in their grabbing. The most striking observation is that there were marked individual differences in these tendencies. Some of the babies were natural non-resistants, others were very sensitive to interference with their activities. Here we have raw materials for the formation of social attitudes.

Similar individual differences are strikingly illustrated in a later study of older children aged two to seven years, in the same institution (The Psychological Institute of Vienna). Pearl J. Greenberg, proceeding apparently on the assumption that competitiveness is a desirable form of "energizing" motivation, studied its development in 65 children aged two to seven years in an experimental play situation.³ She took the children in pairs into a pleasant room and seated them at a table on which were interesting new building blocks. After a little free play during which each child "made something," the question was asked, "Which is prettier?" Then the children were asked to build again and see which could build "prettier." In the next situation they were asked to see which could build bigger.

Even in this experiment, deliberately planned to bring out competitiveness, no evidence of it appeared in the youngest children. The children aged two and three merely played with the blocks, many of them paying no attention to the other child. Half of them did not seem to understand the question, "Which is prettier?" and those who did, nearly always answered, "Mine!" without hesitation or looking at the constructions. As Greenberg says, the development of competition is dependent upon an ability to deal with the materials involved and *an understanding of the situation*. Competition involves intellectual factors: it is not mere instinct.

In the next age group, Greenberg reports that there is more interest in the other child than in the building, the first question is understood, and there is more grabbing (not mere

³ P. J. Greenberg, "Competition in Children - An Experimental Study," *Amer. Jour. Psychol.*, 1932, 44, 221-248.

taking). Figure 36 shows some of the changes in the various types of response to the situation. In the four-year-olds competitiveness in this situation is seen to be at a high point. After quoting remarks made by the children the author says, "Perhaps the reader can gather something of the tenseness, the speed, the competition in the air. Note especially the kind of personal remarks made, the grabbing and hiding of

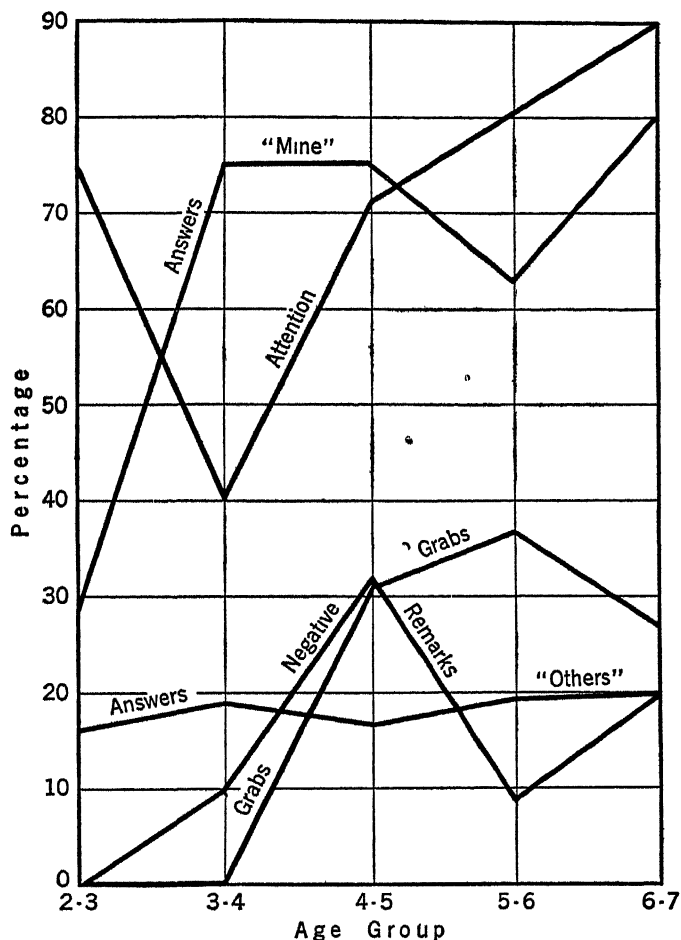


FIG. 36. COMPOSITE PICTURE OF CHILDREN'S RESPONSES

From Greenberg, "Competition in Children: An Experimental Study," *Amer. Jour. Psychol.*, 1932, 44. Reproduced by permission.

stones, the increase of muscular tension, and the final out-and-out quarreling."

In spite of this atmosphere some of the children, although they showed a desire to excel, did not grab or make disparaging remarks. And some even in the older group simply did not compete. They played, they noticed, they told which they thought was prettier or bigger — that was all. This study affords no support for the theory that competitiveness is universal in young children.

When competitiveness is studied in more natural situations or by using different criteria, investigators naturally get a different type of result. Graves, for example, studying competitiveness in preschool children as exhibited in conflicts with other children, found little relation to age within the age range of her group.⁴

The numerous studies on competition which have been made⁵ indicate clearly that competitiveness or aggressiveness is no definite something, no particular behavior possessed by all children — an instinct. Competitiveness is rather a general name for a loosely organized tendency based on native ways, but developing in social soil and varying according to conditions.

That a tendency to compete is closely related to the dominant customs and ideals of the particular culture in which the child grows up might be suggested to observing parents by the quickness with which the little child absorbs the family *mores*. The relationship is clearly brought out in certain studies by Ruth Benedict, Margaret Mead, and other anthropologists.⁶ Mead reports that a first-hand analysis of the social behavior of the Arapesh of New Guinea shows them to be a gentle people, strikingly non-competitive in their ways as compared with the people of Western Europe and a large part of the Americas. Their children grow up, it seems, without the strong urge to get ahead with which we

⁴ E. A. Graves, "A Study of Competitive and Cooperative Behavior by the Short Sample Technique," *Four Abn and Soc Psychol*, 1937, 32 343-351

⁵ G. and L. B. Murphy, and T. Newcomb, *Experimental Social Psychology*, Harper, 1937, chap. 8.

⁶ Ruth Benedict, *Patterns of Culture*, 1934 Margaret Mead, *Growing Up in New Guinea*, Morrow, 1930, and *Coming of Age in Samoa*, Morrow, 1928; Margaret Mead et al., *Cooperation and Competition Among Primitive Peoples*, McGraw-Hill, 1937

are so familiar that it appears inborn. They develop neither aggressive personalities nor "inferiority complexes" arising from thwarting of this strong urge. Studies of the Zuñi Indians of New Mexico reveal a similar type of social attitude and behavior. It is reported that teachers accustomed to employing the various competitive devices to stimulate effort which are a feature of our Western white culture, find these relatively ineffective with Zuñi children. One teacher told her class, at the blackboard to solve an arithmetic problem, that each one was to work until he had finished his problem. The first one that finished was to turn and face her, and so on until all had finished. She waited in vain. Children who were finishing early looking sidewise at their neighbors, unwilling to be the first to turn!

Contrasting with these nonaggressive peoples are others among whom competitiveness is very much more in evidence than in our own society. The Kwakiutl Indians are said to have a harshly competitive type of social life. Again there seems to be evidence that the social spirit of a people may change from one historical period to another. Such a change seems now to be in progress in China.

Observation of individual children also lends support to the view that such factors as competitiveness are largely the product of social factors. Not much of this evidence has been published, but such books as that of Bruno Lasker on race attitudes in children⁷ illustrate clearly how greatly a particular child's social attitudes may be changed by unconsciously exerted adult influence, or through increasing exposure to newspapers, stories and books which reflect the dominant social attitudes and customs.

An instance from the author's observation illustrates the flexibility of social "urges" in early childhood. Two children, Mary and Helen, were brought up in a household where the words "thine" and "mine" were never used aggressively, and during their later preschool years attended a nursery school where all the toys "belonged to the school." These children received many gifts from friends and relatives, but promptly forgot which belonged to which girl. Frequently one child would be observed asking the other who was using a certain toy, if she might play with it, though

⁷ Bruno Lasker, *Race Attitudes in Children*, Holt, 1929.

the observing adult knew it had been especially and recently bestowed upon the first child. One day a neighbor child said to four-year-old Mary, who was playing with Helen's toy wagon — "That's Helen's wagon, I'm going to ask her to let me play with it." At this time Mary paused to say with somewhat indignant emphasis, "No, that isn't Helen's wagon — it belongs to each other!" Between these children conflicts over the possession of toys have not yet been recorded, though one of them is now past preschool years, and they are normally active youngsters.

Some very suggestive work has been done in the modification of aggressiveness. Recognizing that for successful social adjustment the ability to assert one's rights and at times to take the lead is important, some teachers have tried to provide conditions for a shy and over-yielding child which will "bring him out." One means of doing this is to place him with a group of other children most of whom are not older and stronger than he, or who are not more experienced in the activities being carried on. In schools and camps and in neighborhood playgroups the application of this principle has sometimes been followed by striking changes in individual children.

Controlled experiments bearing on this point were carried out in 1934 by Lois M. Jack on 18 four-year-olds at the University of Iowa Nursery School.⁸ She first studied the children from behind a one-way screen, while they were engaged two at a time in sand-box play for five minutes. The children were rated carefully on an aggressiveness scale based on definite items of behavior during this play. Those who rated lowest in aggressiveness, which in this situation really meant ability to play freely and with considerable initiative, were then given special individual help with three activities — making designs with blocks; assembling a puzzle, and learning a story — until they were competent in these situations. After this training they were again observed while paired with the other children. The greater self-confidence of the trained children was reflected in more confident behavior while with the others and in definitely increased "aggressiveness scores." Two years later M. L. Page carried out a

⁸ Lois M. Jack, "An Experimental Study of Ascendant Behavior in Preschool Children," *Univ. of Iowa Stud Child Welfare*, 1934, 9, No. 3.

similar experiment on 107 preschool⁹ children, and secured similar results.⁹ In this case there was evidence that the increased self-confidence carried over to other activities. Thus these studies agree with the experience of progressive teachers (not all of whom are teaching in progressive schools), in indicating that certain social aspects of personality which may seem to be pretty deeply fixed are really a function of the child's experience and position in the group, and hence more easily modifiable than most people have thought. They also suggest that progressive teachers may have overemphasized the "hands off policy," the ideal of keeping as much as possible in the background and letting the children follow their own interests and "native" inclinations.

The Development of Sympathy.—We have already called attention, in discussing family relationships, to some of the raw materials of sympathy, or, to use Lois Murphy's phrase, the roots of sympathy. The natural expansiveness of a well-fed, well-cared-for child, plus, very probably, some sort of hereditary disposition to respond sensitively, results in positive modes of response that later make possible a trait of sympathy, and the development of family attachments provides an organized basis for its expression. But since sympathy is usually taken to mean positive feeling directed toward another person who is hurt or in distress, the capacity to be hurt one's self, to experience pain, is a fundamental basis for sympathy. In this capacity individual children seem to differ, some showing a shrinking sensitiveness to pain, others being more hardy. Doubtless specific psychological and anatomical differences are important here. An example is the fact that some people are far more sensitive to mosquito bites than others and respond with much more soreness and swelling. General sensitiveness to stimuli, whatever it means; is undoubtedly also involved in sympathy.

On the basis of such capacities children early become conditioned to respond almost automatically to the smiles or the tears of others. As conditioned social smiling develops so does conditioned crying. Ideational factors also early play a part. As the sight of a person yawning, or the thought of

⁹ M. L. Page, "The Modification of Ascendant Behavior in Preschool Children," *Univ. of Iowa Stud. Child Welfare*, 1936, 12, No. 3.

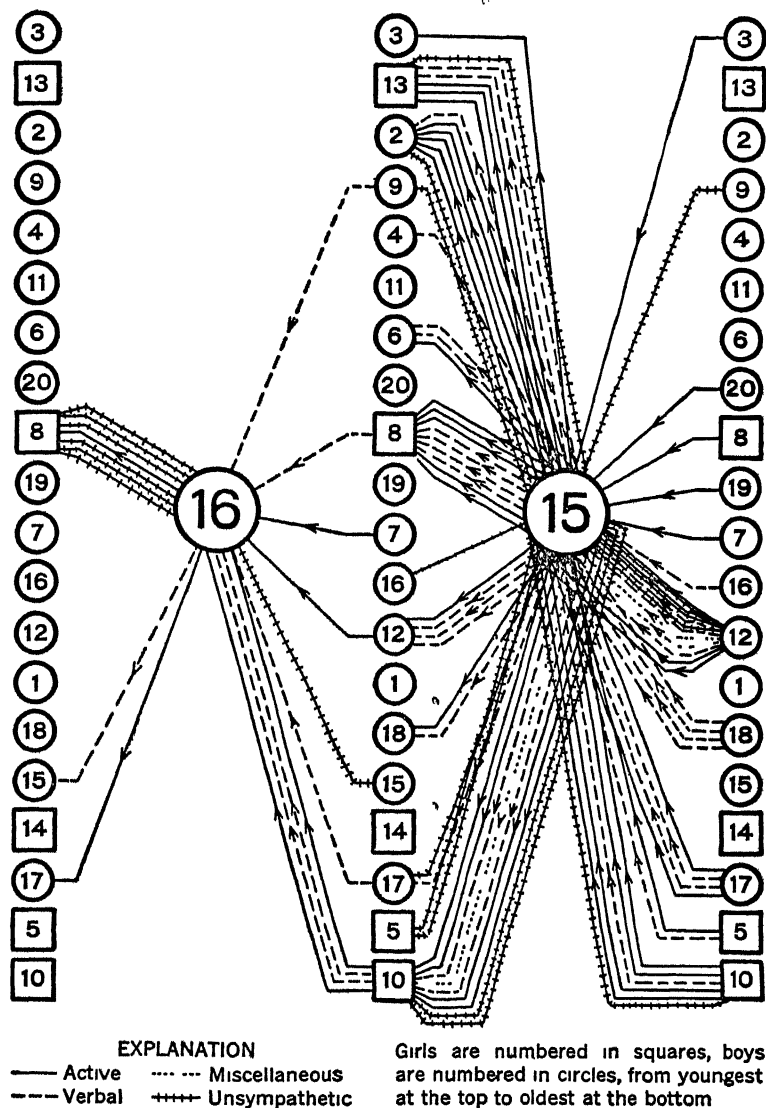


FIG. 37. DIAGRAM OF INDIVIDUAL ROLES IN THE GROUP
 REINHARDT (16), 48 MONTHS, AND PATRICK (15), 50 MONTHS

Reinhardt's few contacts included a majority of unsympathetic ones, Patrick, who was unhappy and unsympathetic in 1932-33, is more happily placed in his group and is both recipient and giver of many responses. From Murphy, *Social Behavior and Child Personality*. By permission.

the wide individual differences in sympathy which were a feature of the results.

The question whether these sympathy scores were constant, and hence a true measure of a more or less stable trait of sympathy, is partly answered in correlations obtained between scores on the playground and scores in the framed situations. These were uniformly low, partly because the set-up of the framed situations, with an adult conspicuously present, favored conventional responses. On the other hand, there was a high but not extremely high correlation ($+0.80$) between teachers' ratings and observation scores. In discussing the relationships between measures of sympathy and of other social traits on which these children had been rated or otherwise measured, Murphy points out some very interesting interrelationships with aggression, health, and other factors.

But our chief interest at this point is in her finding that the very same children when measured in different years, often showed striking changes in some or many of these traits, including sympathy. In Figure 38 are two diagrams illustrating the striking changes which a different social or other setting may bring about. Some children are much more consistent than others, but most children seem to vary considerably according to the situation, their previous experience and understanding, and many other factors. This finding agrees, the author submits, with common sense observation. Writers on children have long called attention to the striking inconsistencies of their conduct. With age we may expect more consistency in this as in other traits (cf. p. 409).

There was a significant correlation with chronological age ($+0.36$) indicating a general tendency for sympathetic responses to increase with experience, as we should expect. But there is also a significant positive correlation with aggressiveness. This means in the first place, probably, that the more active a child is the more contacts of all sorts he makes—aggressive as well as sympathetic. Murphy, relating these results to the ambivalent competitive-coöperative attitudes in our culture, believes this correspondence is a correlate of that ambivalence. And she is probably right. In a

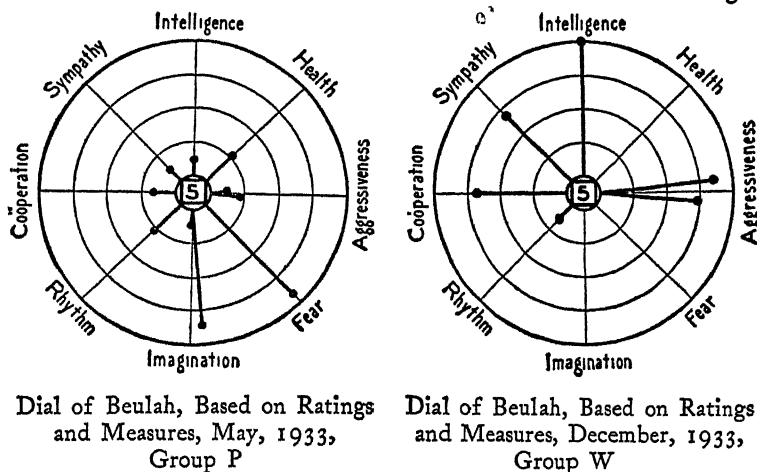


FIG. 38. These dials illustrate the dramatic change in the ranks of one girl after she went into a different group. In this case the change in social behavior with increased security in the group is striking. From Murphy, *Social Behavior and Child Personality*, p. 244. By permission.

social group which worships Jesus and shuts out Jews it is no wonder that sympathy is associated with aggressiveness.

Analysis of the Development of Social Behavior in General.—With this analysis of competitiveness and of sympathy in mind we may now come back to social development in general. The point we made at the beginning of this discussion about the non-social nature of the little child is supported by these studies. Social behavior is lacking in the small baby, and develops gradually.

The egocentrism of the little child which we took up in connection with the growth of meanings is, the author believes, an inevitable correlate of his relative lack of social experience. To say that a child is egocentric does not imply that he is selfish or in any way lacking in the qualities fundamental for the development of positive social traits. How the baby in his first thinking could be anything but egocentric, the author cannot conceive. How, possibly, could he assume the point of view of another person before he even has a point of view of his own? The baby's amusing slow progress in learning how to turn around before sitting down

in a chair is an illustration from the non-social sphere of his difficulty in developing a point of reference outside of himself. Hair-pulling and pinching are babyhood pleasures which illustrate the rudimentary state of a baby's social development. Of course in those first months he doesn't get the point of view of the person whose hair he is pulling. There is no way by which he could, at his age. These things must come gradually. The hair-pulling comes, too, at the same time as the most loving, cuddling behavior. Intellectual egocentricity is not at all incompatible with positive social responses.

Through the constant social stimulus to which he is subjected, the baby soon learns to want to be like others and to have the experiences that they have. On the basis of the early conditioned gestures and little ways of doing things he is able, as soon as he learns to think and talk and want things, to proceed to practice the ways of others that appeal to him.

It is no wonder that the little child wants to be like his parents and older brothers and sisters—he sees them constantly getting things he desires, doing things he wants to do but can't. Thus deliberate imitation of the acts of others is a common feature of the activity of very little children.¹¹ The author once noticed a friend sitting with one leg crossed over the other, in a chair next to a two-year-old child. She saw the child cross his legs similarly; then, eying the older person closely, he uncrossed his legs deliberately and carefully crossed the right leg over the left. He had noticed the difference and wanted to sit just as the older person was sitting.

William Stern has called attention in a stimulating way to the great importance in the development of personality of that make-believe play of little children which consists of pretending to be someone else.¹² This type of play is likely to be particularly common between three and five years. Stern says that it gives the child a chance to try out in a serious way the various possible rôles he would like to fill. In later childhood the same sort of mechanism underlies, of course, the games of Indian, farming, hospital nurse, and

¹¹ C. W. Valentine, "The Psychology of Imitation with Special Reference to Early Childhood," *Brit Jour Psychol*, 1930, 21, 105-132

¹² William Stern, *Psychology of Early Childhood*, Holt, 1924

war. The author has observed much play of this character carried out with the utmost seriousness, the small child almost forcing other members of the family to play different rôles also in order to support him.

Thus, on a basis of instinctive and constitutional characteristics, the baby, gradually at first and then more rapidly as he learns to handle language, becomes a social being, more and more social in his language and his thought, more and more interested in and capable of taking the point of view of other people.

The analyses of competitiveness and sympathy have also suggested the crucial rôle of the dominant social patterns already developed around the child, in forming his social traits and social attitudes. The family influence, which usually but not always reflects the culture of the whole society, is a compelling one. But after the very earliest years, the whole weight of society, through playgrounds, schools, churches and the like, is effective in impressing on the child its leading ways and ideas. Often the influence of dissenting parents is almost or completely neutralized by this social influence.

The outstanding generalization that may be made on the basis of our analysis and survey of the work on the development of social behavior is that there are no fixed generalized modes of social response in children, no social instincts in the traditional sense. Competitiveness may be a powerful motivating factor in some societies, not in others, in some individuals but not in others, at a later period of a child's life, perhaps, but not at an earlier period. Coöperativeness, race prejudice, sympathy, pugnacity, attachment to property, and other social traits and attitudes, all flourish in certain soils and not in others. All of these involve important types of social motivation which may or may not be dominant in certain individuals and in certain societies. They are not instincts.

ETHICAL CONDUCT

The line between social and ethical conduct is hard to draw. In general we may say that ethical conduct is socially approved conduct. It is the sort of conduct which in a given social group is called right. Unethical conduct would be the converse of this. In a broader sense ethical conduct or be-

havior would include any activities to which the judgments right or wrong would customarily be attached. It is an important part of the task of the child psychologist to analyze the conditions under which ethical conduct develops and ethical judgments are formed. Much of the work in the field of social behavior is strictly relevant but there has been a good deal of work on various types of ethical behavior as such. Studies of delinquency, as we have suggested, also throw very revealing light on the complex situations that enter into the development of social and ethical standards and conduct. Just as a study of abnormal mentality brings into relief common mechanisms of normal conduct, so does a study of the development of definitely antisocial trends illuminate the process by which less markedly unethical but nevertheless socially undesirable trends may become established.

Before presenting an analysis of factors in the development of antisocial (and also merely unethical) conduct we shall describe a concrete case of a delinquent studied by Dr. William Healy and his staff at the Judge Baker Foundation in Boston.¹³

Abigail Hardell, sixteen years old, was brought to court charged by the staff of the Boston People's Institute with stealing two hundred dollars from their Christmas Savings Club. She had confessed to some earlier stealing of clothing and jewelry, and it was known that she must have been lying and fabricating extensively previous to this last theft. She was an attractive, healthy girl of normal mentality, and although she had a very poor social background, she had impressed the Institute workers as wholesome and trustworthy. She was the youngest of several children. Her mother, an excessively religious, stern, and parsimonious native of Vermont, had left her drunken husband when Abigail was four, and had since that time supported the family alone. They were now living in Boston in a cheap tenement. The mother, who believed all pleasure was sin, was a scold who talked continually of money and beat even her grown-up daughters. The girls wore made-over clothes and saved in every possible way. There was some minor delinquency and running away among the older sisters.

¹³ *Judge Baker Foundation Case Studies*, Series 1, case 12, March 1923.

Abigail for the last four years had frequented the Institute, taking full advantage of the recreational facilities and going to the camp each summer for a short vacation. Now in the second year of high school, she was only a fair student, but was interested in her studies and the school activities. Her written compositions were unusually good.

The girl did not deny taking the two hundred dollars from the Institute, but lied about the details of its disposition. She was known to have spent a large part of it on clothes for herself, and some for a present for an older girl on whom she had a "crush." She had recently been making false charges for supplies, and had stolen and lied to people at the Institute.

It was found that though at one high school Abigail had been a leader, at the next she was thought "stuckup." The last summer she had made herself so disagreeable in camp in that respect that she had to leave. Because she considered herself superior to other girls from the tenement district she antagonized them. She was critical in the Institute Clubs, often finding things wrongly done. "It came to light that to her companions and in the schoolroom Abigail had been indulging in well-concocted fabrications. She had told tales of rich relatives, of an uncle who had a large estate near Manchester, Vermont, where so many wealthy people live, and of how sometimes he drove down to Boston to see them, always putting up at the Copley-Plaza. And to some she declared she was engaged to a young Vermonter who was an officer in the army and wealthy. Once she came home with a bouquet of violets and orchids (this was about the time when she had the stolen money) and said that it had been given to her at a party where she was the guest of honor. In the schoolroom one day she burst into tears and gave a graphic description of the heroic death of her father at Ypres." (As a matter of fact her father was alive and, she had every reason to think, living a miserable life.)

Abigail herself denied ever having taken anything until the preceding summer, when she had stolen clothing from a high-grade shop, where she worked. The other girl who worked with her in the specialty shop had talked about how unfair it was that wealthy people could come in and buy all these lovely things, more than they needed. Abigail re-

membered conditions⁶ in a well-to-do family where she had worked. At the Institute the idea of taking the money came like a flash, and she took it at once without thinking what she would do with it. She was not boy-crazy and had not been worried by sex ideas. She did not worry about her father, she said; why should she, he didn't worry about them. She did feel badly sometimes about the way she had to dress. During this interview Abigail confessed part of her delinquencies, but it came out later that she had concealed some incidents and lied about others.

With the case of Abigail in mind we may proceed to an analysis of factors in the development of antisocial conduct.

ANALYSIS OF FACTORS IN THE GENESIS OF ANTISOCIAL CONDUCT

Motivating Stimulus.—We may assume that any more or less persistent course of action is a response to some stimulating situation which recurrently dominates behavior until it is in some way satisfied. We saw in a previous chapter how persistently certain fundamental physiological motives keep stimulating the organism until something is done which relieves or puts an end to that stimulation; and how through continued learning acquired motives of many different kinds including hopes, purposes, and definite volitions, may similarly dominate an individual. We saw that motivation through learning becomes exceedingly complex, that many motives characteristically operate on an unconscious level, and that motives of which the individual is sometimes conscious may at other times play a part in determining his behavior although he is entirely unaware of their influence. Perhaps the most important point made, in relation to our present interest, was that the strength of a motive is apt to be proportional to the degree of thwarting to which it is subjected.

There is no special reason to suppose that the physiological motives of hunger and sex, or other tissue needs, are particularly prominent in delinquent as compared with non-delinquent behavior. It is true that there seems to be somewhat more poverty among delinquents, but on the whole, if we can judge by physical measurements, they are as well fed

as non-delinquents, taking the population as a whole.¹⁴ As for sex, most psychologists do not question its importance in the motivation of normal children, and it would be hard to show that it is any more influential in delinquents.

The actual study of thousands of delinquents by Healy and his staff reveals the fact that the delinquency of an individual is likely to be related to a very complex and shifting set of motives, in which, however, some are dominant. Such a case is that of Harry Harmond, an emotionally unstable boy, brought up in several foster homes, most of them poor. His delinquency took many forms, but through them all we can see the influence of persistent special motives—particularly of the desire for love from his father, of shame connected with early sex experiences, and of craving for a “real” home. When the chief of these motives were satisfied in a sympathetic foster home, he became a different boy. Incidentally the pathological mental deterioration which had been predicted by an expert did not occur.¹⁵ In the case of Abigail the motivation seems simpler. Dissatisfaction with home life, fostered by knowledge of better and grander ways of living gained in school and at the Institute, led to specific desires for clothes, wealth, and cultured companions, desires which, consciously or unconsciously, increasingly dominated her.

Hartshorne and May have shown by statistical study some of the probable motivating factors in milder antisocial conduct.¹⁶ They devised and carefully standardized objective methods for measuring different types of deceptiveness. For example, school cheating was measured by allowing pupils to correct examination papers of which literal copies had previously been made, so that all changes were detected. Home cheating was measured by comparing performance on a word-knowledge test which the pupils, having been told to get no help from any source, were allowed to take home, with performance of the same pupils on a different form of the same test given under “honesty conditions” at school. Cheating in athletic contests and in party games was also ob-

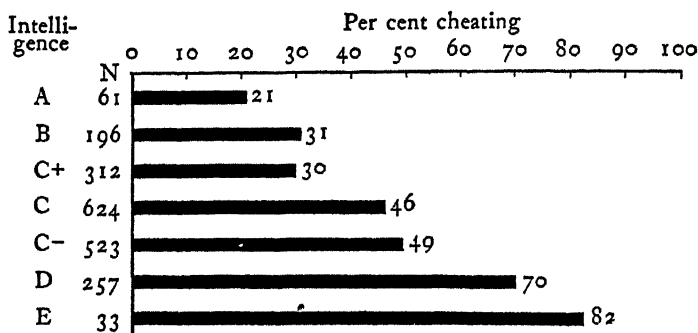
¹⁴ John Slawson, *The Delinquent Boy*, Badger, 1926, chap. 5, pp. 270-349.

¹⁵ *Judge Baker Foundation Case Studies*, Series 1, case 12, 1923.

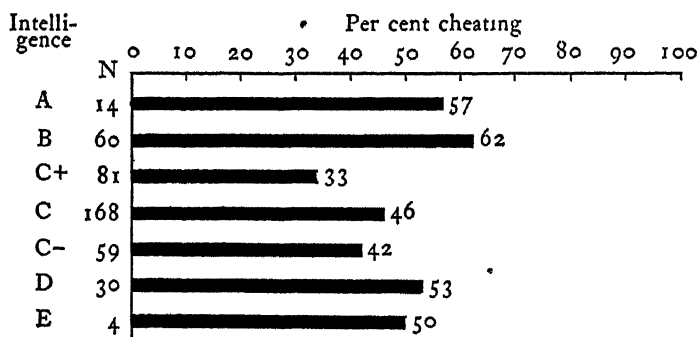
¹⁶ H. Hartshorne and M. A. May, *Studies in Deceit*, Book I, Macmillan, 1928, pp. 181-189, 391-401.

jectively measured by ingenious tests, and so were lying and stealing in different situations.

The results of the cheating tests as given to several thousands of children in grades four to eight show, in the case of school tests involving arithmetical and other academic abilities, a very striking negative relation between amount of cheating and general tested intelligence. Figure 39 shows the per cent of cheating among the total school population tested, A representing the highest scores in the intelligence tests and E the lowest scores. It was found that there was no such relation between intelligence and cheating at parties,



Per Cent Cheating on School Tests at Each Level of Intelligence



Per Cent Cheating at Parties at Each Level of Intelligence

FIG. 39. INTELLIGENCE AND AMOUNT OF CHEATING AT SCHOOL AND AT PARTIES

From Hartshorne and May, *Studies in Deceit*, 1928, Book I, pp. 183, 185.
Used by permission.

as clearly shown in the second diagram.¹⁷ These relationships were unaltered when social status was taken into account—that is, within a given social group the brighter children will cheat less.

It is reasonable to suppose, as Hartshorne and May do, that the desire for good marks, in connection with opportunity to cheat and inferior ability to get those marks, is a basic motive in the deception. In a social situation the intelligent might be supposed to be as often at a disadvantage as the less intelligent, and hence to be tempted as often to cheat. But the situations are not simple. The authors insist on the complexity of the motives for deceit, and on their variability in accordance with the situation. In the case of any unethical conduct whatever we should expect complexity and change in motivation according to the circumstances. It is not that there is usually a general tendency to deceive or to engage in any other kind of undesirable conduct, but that the nature of the total situation at a given time is such that, certain motives being present, this behavior is likely to result.

Existence of a Problematic Situation.—If some of the many things which a child either quite obviously needs, or “needs” because he thinks he must have them, are persistently wanting, then the child is confronted with a problematic situation. Of the true nature of the situation he may in some cases be as ignorant as the white rat is of the maze problem, but like the white rat he will keep on acting in response to the total situation, so long as the motive continues to affect him, and so long as nothing happens to change the problematic situation and weaken or remove the motive.

Problematic situations arise not only from lack of objective “satisfactions,” such as food, money, or works of art, but as a result of conflicting impulses with regard to such objects. In case studies of juvenile delinquents we find over and over again signs of common types of conflict—conflict between the desire to steal and the wish to be true to an ideal of honesty; between the impulse to masturbate and the horrified shrinking from it instilled by training; between tendencies to dislike and to run away from foster parents and the desire to be loyal to them. A striking example of persistent conflict is the case of Abner reported by Healy.¹⁷ At

¹⁷ William Healy, *Mental Conflicts and Misconduct*, 1917, 187-193.

the age of twelve he was a chronic thief, taking "everything he could lay his hands on," but according to his mother often tremendously sorry for his misdeeds. A thorough analysis of the case revealed the fact that the boy had engaged in sex practices with girls, and that apparently both the stealing and the sex practices had started about the age of six. Abner said, "I don't understand about it yet. I was always wondering about it. I think about it when I am sleeping; I mean I dream about it. I dream that girls always want me to do it." He also had had trouble with his stepfather at home. After the review of his case Abner desperately tried various ways to reform but frequently backslid when "a sort of wave" came over him. It was after two years of this struggle that he killed himself by turning on the gas.

The psychologist, aware of the baffling intricacy of mental life with its tangle of motives and its many unconscious factors, an intricacy related to the wealth of experience which any child even a few years old has had, will not be surprised to find hidden conflicts at work, and often, even in non-delinquent children. Children sometimes go through emotional experiences which to an adult are ordinary enough, but to a child terrifying or shocking, and there are formed "unconscious complexes," "repressed ideas," or attitudes which on certain occasions influence conduct, but of which the child himself is not clearly aware. When these non-integrated unconscious tendencies to response are aroused, we may expect poorly integrated behavior — delinquency in some cases, perhaps, fits of depression in others, hysterical physical symptoms in still others.

While we may expect some cases of delinquency to be conditioned by deep-seated mental conflicts, perhaps of many years' standing, others will involve conflicts of a lesser degree of seriousness. Still others, probably most cases of delinquent and unethical behavior, will issue not from continued mental stress, but simply as the easiest and most natural response in a type of problematic situation which continues to recur. For example, the child who for various reasons is keenly desirous of obtaining good grades finds himself again and again thwarted by lack of knowledge or of understanding. If in such a case an answer book is near or he can look unobserved at a companion's paper, one of these

responses is a natural one. Or a child who has been punished for eating candy may do it in secret, and lie if asked about it.

Unethical conduct does not thus usually result from unified tendencies to certain types of wrongdoing which function regardless of the situation, but whether such conduct occurs depends upon the special nature of that situation. Hartshorne and May showed that an extremely high percentage of cheating occurred in situations in which the opportunity to cheat was purposely made very easy; while in the same group of children very few cheated when cheating was difficult or likely to be observed. Some would cheat on puzzles, but not in arithmetic tests; some in parlor games, but not in athletic contests. There was similar variability in tests of lying and of stealing.¹⁸ In other words antisocial conduct is a response in a problematic situation, and the response varies in the same individual in part according to the situation. Normal deceptiveness is not a unified trait which is consistently manifested by a given child. Nor is deceptiveness which is serious enough to amount to delinquency to be regarded as a trait either possessed or not possessed by the individual. Like other delinquent tendencies it is a way of acting in response to thwarted motives, and it varies not only according to the strength of the motive, but especially according to the manner of the thwarting, that is, according to the nature of the problematic situation.

Varied "Attack," or Trial-and-Error Behavior.—When an animal which is being stimulated by some persistent motive encounters a problematic situation, it will naturally, as long as it is healthy and not too fatigued, and the stimulus keeps up, continue to do something. On any one occasion, according to the nature of the stimulating situation, the resultant behavior will include a variety of innate and learned responses which have previously occurred in similar situations.

In our treatment of motivation we described the various main types of activity, direct and indirect, which a human being may exhibit in a problematic situation. After a certain amount of fumbling, overt or ideational, an adequate direct

¹⁸ Hartshorne and May, *op cit*. See especially Book I, chap 21, "The Specific Nature of Conduct and Attitude," 377-390.

adjustment may be made which satisfies the underlying motive. Often, however, no direct adjustment can easily be made, and in such cases various indirectly satisfying activities are likely to put an end to the trial-and-error behavior. These indirectly satisfying activities may be of the substitute or compensatory types, either overt or implicit. Rationalization may lessen the acuteness of the problem, and various forms of hysteria may enable the individual to avoid disagreeable situations. The use of alcohol and other drugs is one means of obtaining satisfaction. Suicide is another way out. Reasoning is a highly effective means of adjusting to problematic situations in which direct satisfaction is for the time being, or even permanently, out of the question. We saw that reasoning involves facing the situation squarely with a thoughtful attempt to make the best of it. It is what Bernard Hart calls the "fight to a finish," and is of course in practice an extremely rare mode of attack. It presupposes the possession of a wide and effective stock of social habits and concepts, together with the habit of self-criticism in the light of ethical standards—an equipment probably possessed less often by delinquents than by non-delinquent individuals.

It is clear that delinquencies often represent obvious and logical solutions of problematic situations, as for example when Burt's hungry London urchins planfully stole leavings from restaurant tables, or when poorly dressed Abigail Harrell took from the shop where she worked the pretty clothes she wanted. In many cases, however, it takes long analysis before the leading motives are discovered and the nature of the individual's problem understood. In some cases there seems at first to be no rational connection whatever between the undesirable conduct and the problem. The individual is simply restless for some reason or other, and does something bad. But, since we do not believe in born criminals, we must assume that there is rhyme and reason in the behavior. We may suppose that some definitely delinquent trends may become fixed as the characteristic way of meeting certain unpleasant situations. The delinquency may be a more or less deliberate means of expressing defiance of unjust parental authority. Direct retaliation being impossible, this way of "getting back" is utilized. But many cases of delinquency

are not susceptible of such a simple explanation—they represent modes of response related in intricate ways to the complicated and changing situations of the individual's life.

In regarding the delinquent acts as representing essentially parts of a trial-and-error attack on a problematic situation we must realize that some of the types of activity above discussed will probably occur along with the delinquent conduct. This is true of Abigail Hardell, whose romantic stories of wealthy relatives and expensive good times, along with her over-compensatory critical behavior toward her companions, represented other "errors" in the varied activity which she exhibited. Sometimes the presence in a non-delinquent child of some of these types of indirect adjustment such as the tendency to fabricate, to daydream excessively, and to overstate one's abilities, may be especially significant as indicating that there exists a situation of sufficient seriousness to warrant a prediction that unless something is done delinquent behavior may develop.

On the whole it is clear that of the various possibilities of action, delinquency is not necessarily the worst way out. At least it is direct action. Indeed, in certain cases it may indicate the existence of strong and positive personality traits, which, if reëducation takes place, may be turned to very good account.

When delinquency is thus viewed as an "error" in the trial-and-error process of adjustment, its relation to such other modes of trial-and-error response as over-emotionality and introversion is at once apparent. Moreover it is easy to see how delinquency may often be related to these other conditions, not as effect to cause, but as merely one of these common effects of the same antecedent conditions.

Solution.—The first delinquent act may, as a matter of fact, not have the effect of relieving the chief motivating situation. Or if it does it may lead to other effects, such as shame and remorse, which may constitute motives stronger than the original. If that is the case the delinquency may not be repeated. If, however, it does have the effect of satisfying the motive for the time being, and if it does not at once lead to serious effects, then we have favorable conditions for its fixation.

Abigail Hardell was not found out when she took the ex-

pensive clothes from the specialty shop. Nor did the act lead to remorse, because it was so easy to rationalize the situation by reflecting how little such things meant to the owners of a shop like this, and how unfair it was for her wealthy patrons to wear such things while she had practically nothing. Nathan Leopold, a young man who was condemned to life imprisonment with his companion for the peculiarly horrible murder of a young boy, excused even his crime by the rationalization that people of extraordinary intelligence are not bound by ordinary moral laws.¹⁹

Fixation.—If the commission of an antisocial or unethical act satisfies the underlying motive, and does not lead to deterrent consequences, outer or inner, then we should expect repetition, other things being equal, when the problematic situation occurs again. The school child, urged on every hand to get good grades, never to fail, is rewarded by better marks when he cheats. He cheats again. The strong emphasis put on grades and promotion in the conventional school may thus actually encourage the fixation of a habit of cheating in certain children. Hartshorne and May compared the amount of deception in a large free public school run in the conventional way, with a large free public school in the same community in which the usual emphasis on grades and promotion was lacking. It is very significant that the amount of cheating, grade for grade and for the groups as a whole, was very much less in the progressive school than in the conventional school. As long as Abigail's romantic stories aroused attention and interest, she told them. As long as her stealing kept her better dressed and was undetected, she stole.

A habit will become powerful and dominant or be utilized merely occasionally, according to the nature of the situation and the individual. After such a habit has once been formed we shall expect it to become automatized, and to tend to recur involuntarily (that is, without preceding thought) under the appropriate stimulation. This of course is the explanation of such phrases, frequently used by delinquents, as "I don't know why I do it"; "I just can't help it"; "I just see things and take them"; or "A sort of wave comes over

¹⁹ Maureen McKernan, *The Amazing Crime and Trial of Leopold and Loeb*. Plymouth Court Press, 1924.

me and I do it." Ordinary people, children and adults, who have made progress in understanding human nature, have learned that much of their own behavior is similarly non-rational, so that one of the marks of an intellectually mature person is his willingness to admit that he does not always know the reason for what he has just said or done.

Persistence of Delinquent Habits.—Just as an ordinary perceptual-motor habit, or an ordinary habit of thought, once formed, may function in the absence of the original motive, so may various habits of delinquency. This is seen over and over again in the case of juvenile recidivists, and it is what we should expect, since an act several times repeated soon tends to be elicited by a part only of the total stimulating situation in which the act was fixated. The girl who has formed a habit of stealing mainly as a response to a thwarted motive plus the sight of objects in the shops, may now steal at the mere sight of objects in the shops. She is, perhaps, a "kleptomaniac," stealing "without reason." Healy gives many examples of the illogical and unnecessary persistence of habits of petty stealing or other delinquencies. In such cases we may assume that the activity once fixated as a satisfaction of a specific motive, sometimes comes to "furnish its own drive," and is then a sort of play. The situation of the poor clerk who learns successfully to play the stock market and keeps on long after he has become a wealthy man illustrates the same process.

This analysis of the factors in the genesis of antisocial conduct, including delinquent conduct, suggests the intricacy of the whole problem. Antisocial acts are, of course, of the widest variety and complexity, corresponding to the whole range of human motivation and varying in causes, nature, and consequences, according to the individual delinquent and the circumstances. In view of this fact it is seen to be futile indeed to search for any simple underlying cause or set of causes for delinquency in general. It seems more reasonable, confronted with the facts of repeated misconduct in a given individual, simply to regard that trend as something which has been learned by the person in question, and then to seek patiently for an explanation of its genesis as one would for the genesis of any other learned activity. This is, of course, exactly what Healy has done with so much success in

the cases he has studied. He has regarded his delinquents, not as creatures belonging in a class apart, but simply as ordinary human beings with special problems and experiences of their own. The general trend of such work, now carried on more and more in the same unprejudiced spirit by others, is to show that juvenile delinquents are essentially normal children.

If antisocial and unethical habits and standards are acquired as natural modes of adjustment in life-situations, so are social and ethical habits and standards. Many of the standards acquired by children are of course merely verbal. They have been learned from others and they are repeated because others approve them. Others are partly the outgrowth of their own experience and function as really helpful guides to action. The student of psychology, aware of the importance of problems in mental life, of the need for learning by making mistakes, finds it easy to see defects in the verbal authoritarian ethical training of the past. Has the child psychologist, in the present incomplete state of this part of his field, anything constructive to offer?

We may suggest, very tentatively, a brief analysis of ethical conduct in children which is related to more recent psychological doctrine as well as to specific work in this particular field.

THE ETHICAL CONDUCT OF CHILDREN

No Innate Moral Sense.—The child does not come trailing clouds of glory, with ideas of truth and beauty gained in his happy play by the shores of that immortal sea which brought him hither, although that poetic statement of a not uncommon belief makes a strong appeal to anyone who has watched a wide-eyed "thoughtful" baby grow up through the delightful first months into the inevitably more or less naughty years of early childhood. Neither does he come into the world burdened by original sin. It has become a truism to say that the child is neither good nor bad, neither moral nor immoral. He is simply non-moral.

Nature and Aims of Ethical Training.—With the decline of authoritarian morality, the conception of the scope

of ethics has broadened, until it has been conceived (by Everett) to be the study of values in relation to the conduct of life as a whole.²⁰ According to his point of view psychologists are contributing to the establishment of ethical values when they point out the effects of such things as the use of alcohol, emotional fixation on parents or members of the same sex, indulgence in dancing, and the like, even though in so doing they have avoided the use of the terms right and wrong. If ethical acts are those which have to do with the conduct of life as a whole, any act whatever may be ethical. In common practice, however, we restrict the term to acts which have consequences either noticeably advantageous or disadvantageous to the individual, or, especially, to his fellows. That is, they are acts which are judged to be either good or bad. Much activity seems neutral in this respect.

Certain general aims for the conduct of life as a whole may be at present taken for granted. In the first place, it would usually be agreed that it is desirable for an individual to try to adjust himself to conditions as he finds them in this world; that is, that he find some present means of satisfying his leading motives. The ideal of denying human wants and ignoring the world we know in favor of a future one is no longer dominant. In the second place, a regard for the welfare of all other human beings has come to be considered a fundamental ideal, partly at least because human beings best realize their capacities and satisfy their needs when living and working together. A third common idea of the eligible life is that it should be so integrated that there is harmony in the satisfaction of the various motives, and no one aspect of life is sacrificed to other important aspects.

Assuming for the sake of argument that the above are not only recognized but legitimate general aims of ethical training, the psychologist may inquire in what ways they are being realized; how effectively certain related habits, attitudes and concepts are being developed in children; and to what extent various methods of education now in use contribute to the development of these habits, attitudes and concepts. Realizing the importance for psychology of research in character study and character education, a number of psy-

²⁰ W. G. Everett, *Moral Values — a Study of the Principles of Conduct*, Holt, 1928.

chologists have in the past few years devoted a good deal of time to the study of special problems in the field.²¹

So far, the main result of these important studies has been the working out of objective and statistical methods. The study is, however, yet in its infancy, and immensely promising as it is, there is as yet no very large body of psychological knowledge in the field. Partly for that reason we shall not here attempt to analyze the results which have already been obtained, but shall merely deal briefly with the general features of ethical development in children.

The Development of Ethical Conduct.—The foundations of morality are present in the behavior of the infant, but it is very gradually that he learns to act in ways which we may call ethical, and it is years before he himself learns to judge his conduct as good or bad. Ethical conduct precedes ethical knowledge, and it is upon knowledge that self-control in the light of ethical standards is based.

1. *Ethical habits are acquired in particular situations.* The theory is implicit in popular thought that ethical conduct in an individual is dependent upon the possession of certain virtues because of which he reacts in certain ways in certain situations—the virtue is an underlying something which expresses itself in particular acts. But as Hartshorne and May point out, a man's honesty is neither a secret reservoir of honest virtue nor merely a general ideal which he holds, but it resides in the quality of the particular acts he performs. According to this "doctrine of specificity," "a trait such as honesty or dishonesty is an achievement like ability in arithmetic, depending of course on native capacities of various kinds but *consisting in* the achieved skills and attitudes."

Hartshorne and May base this doctrine upon their factual studies of deceit. They gave to school children, we recall, many different objective tests measuring, with a high degree of reliability, cheating, lying, and stealing in classroom and other situations. If a child is deceptive in one situation we

²¹ P. F. Voelker, "The Function of Ideals and Attitudes in Social Education: an Experimental Study," Teachers College, Columbia Univ., 1920, *Contrib to Educ.*, No. 112; V. M. Cady, "The Estimation of Juvenile Incurrigibility," *Calif. Bur. Juv. Res.*, 1923; Vernon Jones, "Children's Morals," chap. 11 in the *Handbook of Child Psychology*, 1933; Jean Piaget, *The Moral Judgment of the Child*, Harcourt Brace, 1932; Goodwin Watson, *Experimentation and Measurement in Religious Education*, 1927.

might expect him to be in another. If he cheats we might expect him also to lie. While there would be exceptions, we might expect a very high correlation between the deception scores of a large group of children on one test and deception scores of the same children on another test.

As a matter of fact, Hartshorne and May found a high mathematical correlation between deception scores on tests of the same type, such as between cheating on arithmetic tests and cheating on a vocabulary test (the average intercorrelation of three school tests was $+ .696$). But between deception scores on tests of different types correlations were much lower. For example, the correlation between cheating in school and cheating in athletic contests was only $+ .198$; and the correlation between tests of stealing and tests of lying was only $+ .132$. There was even much variation within a given type of test according to the nature of the material. The authors say that such slight changes in a test situation as from crossing out A's to putting dots in squares are enough to alter the amount of deception both in individuals and in groups. This variability of deceptiveness according to the situation is evidence that deceptiveness is not a particular entity either possessed or not possessed by an individual child. It consists rather, say Hartshorne and May, in a loosely organized system of habits or attitudes which have been learned in special situations, and which are then ready to function in similar situations.²²

The results indicate that, other things being equal, a habit learned in one situation may be expected to function in another situation only to the extent that the second situation has features like those of the original or is judged by the child to be similar to it. A class taught to multiply three place numbers but not to divide, will not learn the second operation without specific training; children who have learned to cheat in school will not take money from home unless the situation at home is in some way conducive to the development of such conduct; a boy who is an habitual truant may also indulge in petty stealing, and, it seems, frequently does so, not, however, because of a general tendency to delinquency, but because while he is absent from school specific situations arise which favor stealing.

²² Hartshorne and May, *Studies in Deceit*, Bk. I, p. 379.

Desirable social habits and attitudes are of course learned in the same way that undesirable ones are, and are no more dependent than they are on a *mere* general tendency or trait. The fact that a young girl would never dream of reprimanding a guest in the house for accidentally breaking a dish, is no guaranty that she will show similar thoughtfulness to servants, any more than the fact that the average citizen conscientiously pays his grocery bill is a guaranty that he will state his income correctly to the tax assessor.

2. *Ethical standards are based on the spontaneous native and acquired reactive tendencies of the organism.* It is in connection with native and acquired reactions which are already functioning in specific situations that those verbal formulations develop which we call ethical standards. In general, situations which the child natively avoids and the reaction to which is unpleasant are actually undesirable from the point of view of effective adaptation; things which elicit positive and consequently pleasantly toned behavior are desirable, objectively speaking. Now the adults among whom the child grows up apply the word bad (or similar words according to the circumstances) to the first type of situations, the word good to the second. And even after the native responses have been somewhat modified through teaching or through the results of individual experience, this general correlation will hold.

Thus the child's first ethical judgments, Carr points out, are likely to be based on the immediate character of the objects and the responses they elicit. Whatever the child tends naturally to react positively to, natively or as a result of early teaching, he will regard as good; whatever he tends to avoid will seem bad. The child's first judgments of his own activities will therefore be based largely on their immediate personal consequences, and his judgments of the activities of other people will be based on their effect upon him. If the act of another hurts him, elicits negative and unpleasantly toned behavior on his part, he will call it bad; if its consequences are pleasing to him personally, he will call it good.

3. *Childish ethical standards become progressively socialized.* Gradually the child learns to base his judgments upon the social consequences of his acts, as well as their consequences to him personally. He also learns to apply the

terms good or bad in accordance with future consequences, which he foresees, as well as immediate consequences. As this development takes place, the judgments good and bad are less closely associated with pleasant and unpleasant behavior. Some acts which are immediately pleasant come to be judged bad or wrong, because of their social consequences; and some which are unpleasant are seen to be good.

Some of the factors in the transition from an individualistic to a more impersonal ethical standard are thus summarized by Carr:

"Necessarily many acts must be experienced and evaluated from both points of view (of the individual and of society). The same individual may both cheat and be cheated, and the young bully may in turn be bullied by a larger companion. Sympathy and love for others, and the desire to placate and win the approval of our fellows also constrain us to envisage our acts from their point of view. For numerous reasons we all become members of various social groups, and naturally come to identify to some extent the welfare of those groups with that of our own. In other words, we develop a social personality, and as a consequence begin to evaluate all acts more and more from the standpoint of our wider social self-interest — from the standpoint of the groups to which we belong. In the process of mental and social development, each individual enters into and identifies himself with larger and more inclusive social groups such as the home, the church, the school, a professional or economic group, the community, the state, the nation, and his racial group. Beginning with an egocentric attitude, each developing individual is forced to keep continually revising his ethical values from the standpoint of a more inclusive group, until the ideal is finally attained of judging all things from the standpoint of the welfare of humanity as a whole. . . Each individual's ethical conceptions are gradually acquired through life, while the ethical standards of any race are the products of its racial development."²³

Social influence on ethical development is exerted through direct teaching. The child is interrupted, restrained or subjected to physical punishment whenever he does or says something that runs counter to the standards of the adults surrounding him. At the same time he is told, "No, no!" "Shame!" and the like, and hears such words as bad, selfish, mean or wicked used in certain types of situations. Thus he is taught to talk and to think in the approved ways

²³ H. A. Carr, *Psychology*, Longmans, 1925, chap. 13, "The Affective and Evaluating Aspects of Experience." The student is advised to consult this chapter as an outstanding objective treatment of values.

in these situations. Especially approved activities are not only allowed to continue, but are rewarded or praised: These the child learns later to call, according to the situation, good, kind, unselfish, honest, and the like.

The child probably learns more, however, through example than through precept. In his daily life at home, at school and church and theatre, he observes the behavior of adults, and finds in it the patterns for most of his own activity. The ethical judgments expressed incidentally by adults in conversation with each other, with no thought of his instruction, are of course taken seriously by him. Moreover many indirect expressions of approval or disapproval give rise, through association with more elementary situations in which there is direct sensory reward or punishment, to ethically important attitudes and concepts. Thus a little girl who could not read heard her older brother and sister express disgust, on various occasions, at finding a story "continued." Hence she supposed that all continued stories were very bad, and for a long time was consumed by curiosity as to their nature.

4. *Knowledge of consequences makes volitional ethical control possible.* If a child has learned the appropriate verbal symbols along with specific ways of responding in certain situations, then, when the situations later recur, the verbal symbols are likely to be reinstated first; and according to the circumstances they either check or favor certain lines of activity. Thus when the child encounters a situation tending to elicit a response which has had disrupting or inhibiting consequences, personal or social, and which he has learned to call bad (or some other such term), the previous verbal judgment may be reinstated and the child may refrain from the act, not necessarily because he has been strongly enough conditioned on a sensory-motor level, but increasingly, as he grows older, because the consequences of the act are symbolically reinstated before performance; and the judgment "bad," applied accordingly, leads to the substitution of some other act than the one to which the situation, in the absence of previous experience, would have led. In a precisely similar way the child may learn to foresee the beneficial consequences of his acts, to judge them good and to react accordingly. Thus, as Carr says, the possibilities for ethical conduct

are directly related to the knowledge which an individual has of the probable consequences of his acts.

Some Implications of These Principles of Development for the Control of Conduct.—The preceding brief account of the way in which ethical conduct develops has important practical implications.

In the case of young children, or older persons who have not achieved a rational organization of their ethical standards and conduct, verbal teaching is useless unless based upon reactions in definite situations. If they are not so based, standards of conduct may simply be new habits of a verbal character, functioning more or less independently of actual everyday behavior.

The fact that in school children knowledge is not virtue is shown by experimental work. Hartshorne and May found that of nine hundred and thirty-three pupils who copied from keys in school tests, eighty-nine per cent stated their belief that to copy from the keys was cheating. Slawson, when giving the Mathews psychoneurotic inventory, found that the question, "Did you ever feel that you were very wicked?" was answered affirmatively by forty-three per cent of his delinquent boys as compared with twenty per cent of unselected boys, although "wickedness" is a strong word, and many of them, we might suppose, would be unwilling to admit wickedness though conscious of it.²⁴ Weber reports that one hundred and thirty-eight girls in a reformatory, given the task of ranking sixteen bad practices in order of badness, showed as much moral insight as a control group of university women.²⁵

Probably the most telling quantitative evidence we have at present as to the ineffectiveness of mere verbal teaching, is that supplied by Hartshorne and May in their study of the relative amount of deception among groups of pupils otherwise comparable, who did or did not attend Sunday school, or who were or were not members of organizations which have as their chief aim the teaching of character. Dealing with large numbers of children, they found that so far as their tests went, neither the length of time the children had

²⁴ John Slawson, *The Delinquent Boy*, Table 44, p. 251, question 69

²⁵ C O Weber, "Moral Judgment in Female Delinquents," *Jour Appl Psychol.*, 1926, 10: 89-91.

attended Sunday school nor the regularity of their attendance seems to be at all associated with their tendency to deceive either at school or on work taken home. They found, moreover, that, judging by results in the tests, the effects of a well-known organization, "X," were either neutral or even positively deleterious with regard to one of its major aims, the teaching of honesty.²⁶

Consistently ethical behavior may be achieved. The doctrine of specificity might seem discouraging, since it is manifestly impossible for any child to learn all of the literally countless socially desirable ways of reacting in particular situations. But while there is neither a general fund of virtue upon which to draw, nor automatic spread of a desirable habit to unlike situations, transfer does occur, and an understanding of the ways in which it may occur will facilitate control. In the first place we must remember that transfer occurs readily when the new situation has objective features in common with the old. To illustrate, a child who has really learned not to pull the tail of his own gray kitten will not be likely to pull the tail of the black cat next door, or of any cat—and will probably refrain from pulling the tails of dogs or other furry or woolly quadrupeds.

The difficulty in transfer comes when we have two situations the external features of which are quite different, but in which the essential social situation is the same. A child may utterly fail to see in two different situations the common features which are apparent to an adult. And a person who has not acquired the habit of reacting critically and analytically may fail to see in his different daily activities the common features which are apparent to a more thoughtful observer. But if in the course of daily experience the varying situations are analyzed for the child or by him, he may learn the common features and may express them in a general statement, so that when he encounters a new situation he will have insight into it, that is, he will react to the significant features on the basis of his past experience. Through rational analysis and generalization, therefore, what is learned in specific situations is made "transferable" to other situa-

²⁶ Hartshorne and May, *op cit*, Bk I, chap 18, "Sample Studies of the Effects of Moral and Religious Education," pp 339-367.

tions, and it is not necessary for the individual to learn a new mode of response for every concrete situation encountered.

Thus we see that *both specificity and generalization are important in ethical development*. Not only should the special situations which children encounter be favorable to the formation of socially desirable habits; but the children should be encouraged to understand the situation and the reasons for the approved conduct, to the end that their behavior in similar situations may be increasingly consistent and rationally adaptive.

Since the habits of rational analysis and organization develop slowly in childhood, and are employed only irregularly and with varying thoroughness by adults, we shall not look for a high degree of consistency in the ethical conduct of the child, nor be surprised if adults often behave in ways contrary to their ideals. This inconsistency we shall regard as the natural result of the manner in which ethical conduct develops, and not necessarily as evidence of lack of sincerity or "goodness."

Let us take as an illustration of transfer through generalization the case of a child who has learned to give a pleasant greeting to any one of his classmates whom he may meet on the street (granting for the sake of argument that this is an ethical or socially desirable type of response). His parents having moved to a poorer section of the city, this child now meets outside the school some classmates who are dirty and poorly dressed, others who have brown skins and peculiar features. To such features he has learned to react negatively. Will he greet the strange children pleasantly, or proceed either to ignore or to mistreat them? That depends on the child's previous training or the instruction he will now receive. Certainly the mere fact that he has greeted his social equals pleasantly will not automatically cause him to respond thus in the new situation. But if the new situation is analyzed for him (or by him) so that he sees that these children are in most ways like those he has known, that they are as likely to be hurt by unfriendly treatment, and that they themselves are not responsible for their complexion or even for their rough appearance, undesirable as the latter is, then when he sees the new children primarily

as human beings rather than as badly dressed children his manner of greeting is very unlikely to change, although in certain other ways he may behave differently to these children from the way he behaves to others. It is only when the similar features of a new situation are labeled for the child that the appropriate response is likely to be called out.

It is clear that in advance of the actual new experience supposed above, parental or other teaching may pave the way for the desired response, through verbal analysis. The appearance, actions and characteristics of other nationalities and social classes might be frankly discussed, with the aim of getting the child to see what are the factors considered essential by his parents, and to have a desire himself to learn more about other people. But however concrete this teaching is made through such devices as pictures and stories, some actual overt experience is presupposed. In this hypothetical case, supposing pleasant greetings to be generally desirable, the child might get practice in contacts with servants, with the foreign fruit peddlers, immigrant neighbors, and the like. Whatever the nature of the practice, however, effective generalization, which means transfer or application to new situations, is made possible only by rational analysis.

We have already suggested that the rational analysis need not necessarily be made by parents or teachers. The child who has been trained to see problems and to face new situations squarely, will, after he has reached a certain degree of intellectual maturity, himself be able to analyze and more or less adequately to label modes of behavior different from those with which he has been familiar. Since conditions constantly change and each new generation faces new problems as well as old, particular ethical standards will be modified to fit the new situations.

The student could do no better than begin his study of social and ethical behavior by reading one or more good case studies, and unless he confines his reading to preschool years he will have to turn to case studies of delinquents. The Judge Baker Foundation Studies are all of great interest. Two "own stories" of delinquents edited by Clifford Shaw are particularly valuable, and as interesting as any novel. They are *The Jackroller* and *The Natural History of a Delinquent Career*. . . We are in great debt to Gardner and Lois B. Murphy for providing summaries and interpretations of work in the field of social behavior in their *Experimental Social Psychology* (with T. Newcomb), and in their article on social development in children in the *Handbook of Social Psychology*. . . Thrasher's *The Gang* and Furfey's *The Gang Age* deal with some aspects of social activity in older children. . . *Cooperation and Competition in Primitive Society*, by Mead and others, is a report of field studies. . . Hartshorne and May's *Studies in Deceit* and other books in the field of ethical behavior should be known to all students of child psychology. . . Those already interested in Piaget will want to see his *Moral Judgment of the Child*.

CHAPTER XV

THE GROWTH OF PERSONALITY

WHILE there are undoubtedly present at birth factors which favor the development of certain traits rather than others, we expect personality to take shape and form in the course of the child's daily experience in his particular world. It is customary to deny personality to the infant, but to say that it is present at three years, or five, or fifty. The word implies more consistency and more organization than is present in an infant, and it refers to something more than the traits which comprise it. Each personality is a unique pattern or organization of traits.

In this chapter we shall make a somewhat detailed analysis of personality traits in general and the conditions of their development, with regard to the ways in which they are related as functional units of the total personality. In so doing we shall make no attempt to deal with them in separate classifications, as, for example, ethical traits, emotional or temperamental traits, and "intellectual" traits. Traits are so complex and so intricately interrelated that it is difficult to fit them into any arbitrary classification; and besides, a separate treatment of classes of traits might tend to obscure the view of personality as a functioning whole which we wish to develop.

THE NATURE OF PERSONALITY TRAITS

In order to make more concrete and more serviceable the conception of a trait which we presented briefly in the last chapter, we shall cite an experimental study by Floyd and Gordon W. Allport of the traits of ascendance and submission.¹ College students were asked to indicate on printed blanks their usual adjustments, or those which they believed they would make, to a large variety of concrete situations

¹ Gordon W. and Floyd H. Allport, *A-S Reaction Study*, Houghton Mifflin, 1928. See also Gordon W. Allport, "A Test for Ascendance-Submission," *Jour. Abn. and Soc. Psychol.*, 1928, 23: 118-136.

which would ordinarily reveal either dominant or submissive tendencies. For example, one question is, "Are you embarrassed if you have greeted a stranger whom you have mistaken for an acquaintance?" and the student is to check one of the three replies "very much," "somewhat," or "not at all." Another question is, "At a reception or tea do you seek to meet the important person present?" and the student is to check "frequently," "occasionally," or "never." The replies to each situation of the test were scored as plus (ascendant) or minus (submissive), on the basis of independent ratings of the subjects. The total score on the test was the algebraic sum of the ascendant and submissive scores for the separate items. Thus a student who had a total ascendant score of +60 and a total submissive score of -20 would have a total score on the test of +40. This means that although on some of the separate situations he indicated a submissive type of response as usual for him on the whole, if these situations are really typical of life situations commonly met, he tends to assume an ascendant rôle.

Figure 40, giving the distribution of the scores of four hundred college men, shows that a very few, according to the test, were markedly ascendant, making a plus score on most of the situations, while a very few were correspondingly submissive. The other subjects received intermediate scores scattered between these extremes, a large percentage showing only slightly more leaning toward one tendency than the other, or else being pretty evenly balanced with respect to the two.

The test seems to be reliable. When a group of students was given two different editions at an interval of about six weeks, their scores the second time corresponded closely to those for the first edition (correlation +.78); and the scores made on one-half the test situations correlate well with scores made on the remaining items (+.58, or +.73 corrected). Thus the test measures some more or less consistent factor in personality. That is, the responses to the various concrete situations presented evidently indicate that related habits and attitudes are involved. That the test measures what it aims to measure (is valid) is suggested by correlations ranging from +.459 to +.63 between the test scores and ratings by associates and by the subjects themselves on these traits.

The results of this study are interestingly in line with those of Hartshorne and May's elaborate studies of deceitfulness. None of Allport's subjects was completely consistent in his replies. A few, to be sure, indicated ascendant responses to a very large majority of the situations, and a few made a correspondingly high percentage of submissive replies. But in most subjects there was considerable variation according to the situation, so that it may be said that each subject possessed both traits, though in differing degrees. Similarly in the studies of Hartshorne and May, there was considerable variation in amount of deceptiveness according to the situation. The reader will recall that correlations between deceptiveness scores of the same groups on different tests, while positive, were sometimes low, meaning

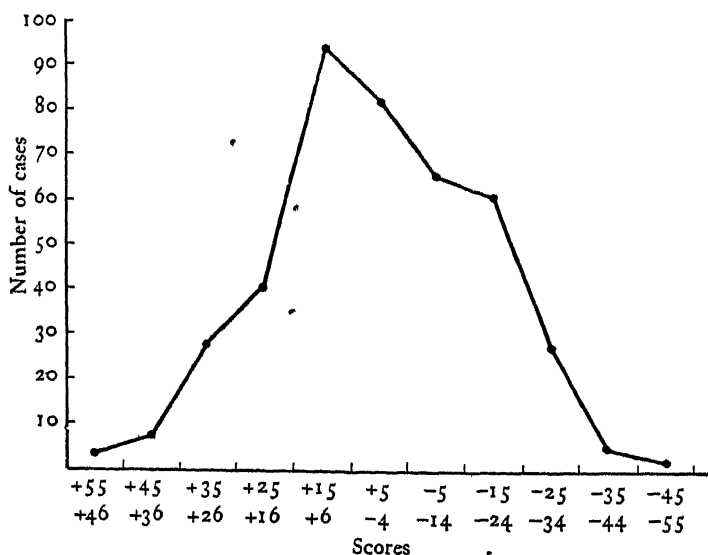


FIG. 40. DISTRIBUTION OF ASCENDANCE-SUBMISSION SCORES OF FOUR HUNDRED COLLEGE MEN

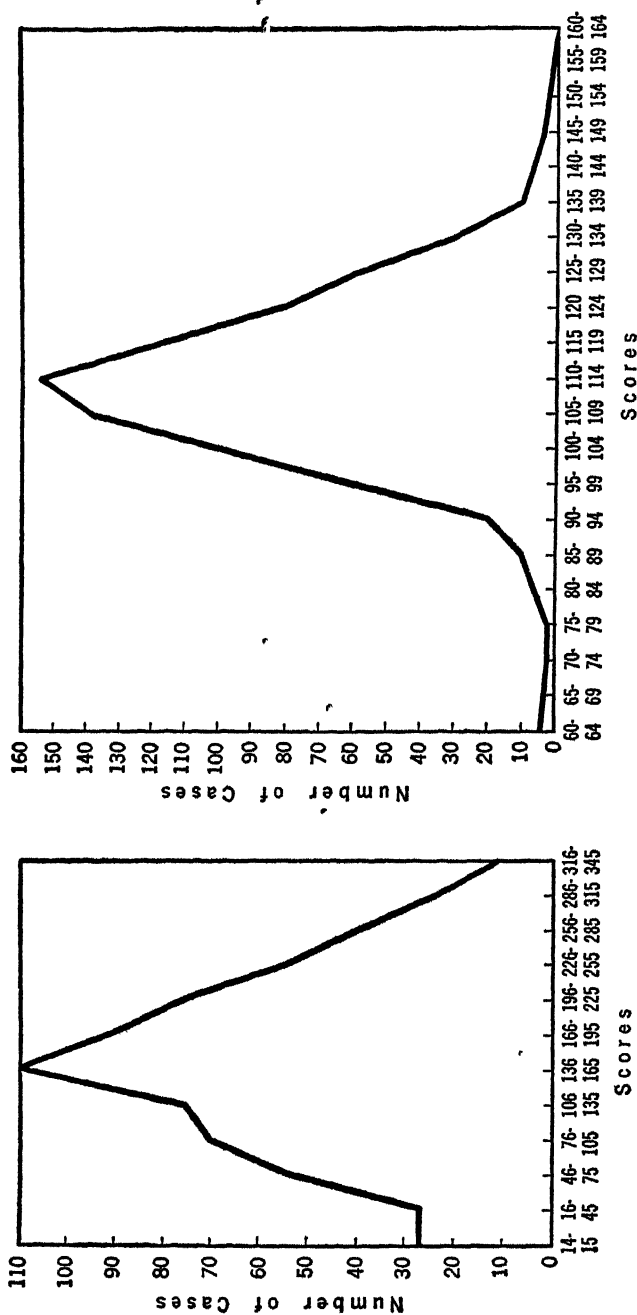
The intervals on the base line represent scores grouped into intervals of ten. For example, three men received scores between +46 and +55, indicating a high degree of ascendancy; and two received scores between -45 and -55, indicating a strong tendency toward submissiveness. Reproduced by permission from "A Test for Ascendancy-Submission," by G. W. Allport, *Jour. of Abn. and Soc. Psychol.*, 1928, 23, 2.

that a child who cheats on one type of test will not necessarily cheat on other tests; and that no child is uniformly honest in all situations, although some children behave with much more consistency than others. In other words, each child has the traits both of honesty and of deceptiveness. Both of these studies, conducted with different aims and by different methods, show that traits are not independent underlying entities which are either possessed or not possessed by the individual child. They are, rather, more or less loosely organized systems of habits and attitudes which have been developed in the process of adjustment to the special and varying conditions of his life.

As in the case of ascendance-submission so in the case of almost any common complex personality trait which we can single out for study, we are likely to find a "normal distribution" among individuals. The curves in Figure 41 indicate that in the case of persistence and coöperativeness a few children exhibit the extremes of these types of behavior, while most children are neither distinguished by unusual "excellence" or unusual "inferiority" in these respects, and there are no sharp dividing lines between various degrees of the traits.

To say that traits are not independent entities is not, of course, to deny that they are real factors in the growth of personality. The fact that in the experiments on deceitfulness positive correlations, and sometimes very high correlations, were found between performances of a group on different tests, testifies to the existence of *more or less* loosely organized systems—to the existence of tendencies to behave in describable ways which may in certain individuals be strong and very consistent. The results of Allport afford statistical evidence of similar tendencies. Thus experimental work does not question the usefulness of the common term trait or characteristic. It simply demonstrates the incorrectness of a common assumption as to the nature of traits which is implicit in popular thought.

It follows from our treatment of motivation, in which we developed the point that any acquired habit may give rise to a motive, that traits, as systems of such "habits," may be expected to function as motives. Just as the absent-minded professor, accustomed to fingering a piece of chalk while he



lectures, may be restless and ill at ease until he has a piece in his hand, so on the same principle will a person with strongly-developed negative attitudes toward stealing tend to be ill at ease if he has yielded to the temptation to take some article, until he has returned it or in some other way "satisfied his conscience." In both cases some internal set of stimulating conditions has been aroused and it is this which is likely to determine the outcome of the situation. The internal stimulating situation (motive) will be strong or weak, and may or may not prevail, according to the strength and consistency of the system of habits which have given rise to it. Thus some school children are honest in most situations, but fail when the specific situation is too compelling (for example when cheating is easy and not likely to be detected); while a few children have been so consistently trained, both in concrete responses and in the rational analysis of new situations, that they refrain from cheating in all but the most provocative circumstances. Hence a well-developed trait is likely to be a strong motivating factor, and like any less complex motive, is more important than the outer situation in determining the responses in a problematic situation.

How Traits Develop.—Personality traits, like any other aspects of mental activity, are formed upon a basis of structural characteristics in the genesis of which heredity has played a part. All of the individual differences which we discussed in Chapter 6 enter into the make-up of the personality. All the ways of acting and of feeling and of thinking, which in one way or another develop in a child from the beginning of his life, form part of the raw materials of personality. We may here briefly outline the ways in which, on the basis of the native and acquired equipment which a child has at any time, progress in the organization of personality traits may proceed. It is clear that traits do not grow automatically as a flower or a weed grows. Maturation and physical growth are factors in their development, but the trait itself can become organized only through learning. In that learning, whether it be largely perceptual-motor or largely ideational, we must remember that motivation is always basic. The form and the unity of traits are determined by the persistence of inner motives which become more complex and generalized as the child grows older, and by the re-

currence, on the side of the outer environment, of external motivating situations.

The infant's behavior is early modified in varied ways through conditioning; and conditioned responses developed in connection with feeding, sleeping, and the attentions of other people, are likely to be the nuclei of traits which in the course of later experience take on more definiteness. The impression that permanent personality traits are revealed in a baby's behavior at or shortly after birth is natural, since parents are anxious to see in the newborn child some promise of personality and especially some likeness to themselves. Thus particularly lusty crying is taken to indicate "independence" or "temper," and quiet reposeful behavior "a sweet disposition."

Objective study has shown that certain modes of response, such as the tendency to smile and laugh a good deal or to cry a good deal, tend to be fairly constant within the very first years, and presumably into later years, although there is change in these tendencies in many individual children.² In the case of Ann we saw that the early tendency to smile and laugh a good deal persisted and was commented upon through all of her first 60 months. As a five-year-old she was said by her teachers to be "good-natured" and to have a "gay sense of humor." Such early ways as smiling and crying, however, are not as such personality traits—they are only important factors in the development of traits. In a study by Bonham and Sargent³ 38 babies were rated during the first few weeks on a number of complex traits, and two years later were rated independently on the same traits. In the case of one trait, "good nature," there was close correspondence in the ratings (the correlation was $+0.93$), but in other traits the correspondence was rather low or not apparent at all in the results. In other words, prediction of traits in early infancy should be made with great caution.

² N. Bayley, "A Study of the Crying of Infants During Mental and Physical Tests," *Ped. Sem. & J. Genet. Psychol.*, 1932, 40: 306-329. See also R. W. Washburn, "A Study of the Smiling and Laughing of Infants in the First Year of Life," *Genet. Psychol. Monogr.*, 1929, 6: 397-537.

³ M. A. Bonham and M. Sargent, "A Study of the Development of Personality Traits in Children Twenty-four and Thirty Months of Age," Master's thesis, Catholic University of America, Washington, D. C., 1928. See also R. Arrington, *Interrelations in the Behavior of Young Children*, Teachers College, Columbia Univ., 1932, *Child Develop. Monogr.* No. 8.

In general, studies have shown a great deal of inconsistency and fluctuation among personality traits in the early years, a point which was illustrated in Murphy's findings on sympathy, discussed in the preceding chapter. This degree of inconsistency results from the fact that the traits are in process of formation. In any fully-developed trait there is still inconsistency, even in an individual representing an extreme degree of the trait, but in general consistency increases with the years.

Some traits which are probably closely related to early behavior and conditioning in babyhood and the very first years are emotional dependence on parents (fixation) because of an excess of petting and cuddling; dominance over others, connected with compliance with the child's wants without regard to the establishment of an optimum schedule; nervousness, conditioned by noises and rough, irregular, or inconsistent handling (sometimes loving, sometimes harsh) such as is likely to be given by nervous adults; and undue submissiveness connected with an over-meticulous insistence on routine and good manners. The various "pats" and "no, no's!" as well as more severe physical punishments condition the little child against certain types of situations, and create attitudes which are gradually consolidated with specific habits and with ideas in "moral traits" such as honesty and unselfishness.

The development of traits is early supplemented, of course, through more complex sensory-motor learning. Punctuality is favored through the establishment of regular habits of getting up in the morning, coming to meals, and the like, and the more consistent the training the better laid is the foundation for this trait. Politeness is favored by such things as the early teaching of standard ways of greeting adults and other children, and social adaptability by practice in playing with other children in groups, and the learning of special skills usually performed in company, such as dancing and various games and sports. All this more complex learning goes on, it is to be remembered, as a means of satisfying dominant motives, and the existence of a motive, operative until enough new modes of adjustment are learned to satisfy it, is the chief basis for the unity of order in a developed trait.

Ideas, along with conditioning and the formation of complex habits, play their part in the development of traits. At first the child is conditioned against taking things by "spatting" his hands or by forcible restraint. After "no no" has become an effective stimulus, the child may think "no no" in the absence of an adult when gazing at a desired object, and refrain. From this time on thinking plays a part in the development of character. The effects of some acts may be ideationally represented by the child, with help from adults, and thus ideational learning, or a primitive sort of reasoning, is a factor in the formation of attitudes and habits.

Interrelationships among Personality Traits.—Since the organism is so constituted that it tends to function as a whole, we shall not expect to find hard and fast lines between traits. A trait is a relative and a functional grouping of habits and attitudes, and so we shall expect to find overlappings and groupings of various sorts.

Certain more general groupings of traits have been experimentally studied. Prominent among these are the two antithetical groups commonly referred to as extroversion, or the tendency to be interested in external reality and to make overt adjustments readily; and introversion, or the tendency to center attention on feeling and thought to the neglect of overt adjustment. Among traits said to be expressive of introversion are self-depreciation, sensitiveness to the opinions of others, outspokenness; radicalism, reticence, absent-mindedness, meticulousness, moodiness, self-consciousness, imaginativeness, and dislike of prominence in groups. Extrovert traits are the opposite of these.

Jung, the psychoanalyst who first proposed these terms, used them as applying to distinct and complementary types of personality, the implication being that all people could be classified as either extrovert or introvert.⁴ Experimental and statistical studies of adults have not supported the theory of distinct introvert and extrovert types.⁵

It has been found that there are well-marked general groupings of such traits as Jung described, and that most

⁴ Carl G. Jung, *Collected Papers on Analytical Psychology*, Moffat, Yard, 1917.

⁵ Max Freyd, "Introverts and Extroverts," *Psychol. Rev.*, 1924, 31: 74-87; Edna Heibredner, "Measuring Introversion and Extroversion," *Jour. Abn. and Soc. Psychol.*, 1926, 21: 120-134.

people show a tendency, *on the average*, to verge either toward the introvert or the extrovert side, when rated on the various traits by close acquaintances or scored on objective tests of these traits. But the organization of traits is very loose, and in general any one person will tend toward "extroversion" on some traits and toward "introversion" on others. If the scores or ratings of a group of individuals on any one trait are plotted in a distribution curve, we get an approximately "normal" distribution similar to Allport's curve for ascendance-submission. If the theory of types held good, we should get a bi-modal curve; that is, the scores would be concentrated at two points, one on the side of the base line representing extroversion, the other on the opposite side. The fact of normal distribution, with most scores clustered in the middle and a gradual falling away in the number of individuals possessing the more extreme degrees of the traits, indicates that the terms extroversion and introversion do not correspond to types at all, but can be properly used only as referring to extremes in a normal distribution.

Since the position of an individual on a scale varying from extreme introversion to extreme extroversion represents merely an average of ratings or scores on a large number of traits; since the great majority of people will be introverted on some and extroverted on others; and since in only a very few unusual individuals will there be extreme ratings in the same direction on a large number of the traits, it is clear that the terms introversion and extroversion have a distinctly limited use as applied to individuals. Nevertheless, if their limitations are kept in mind, the terms are useful as indicating the presence of somewhat generalized tendencies to respond in the manner of more specific traits, much as ascendance means the presence of a general tendency to behave in a dominant way on the basis of specific habits. We might thus think of traits as systems of habits, and apply the name "type-traits" to systems of traits.

"General emotionality," "nervousness," or "emotional instability" are terms applied to a constellation of traits and habits which might be thought of as a type-trait, though perhaps on a lower level, that is, inclusive of fewer contributory tendencies than introversion, to which it is related. The questionnaires designed to measure this tendency deal for the

most part with specific habits of thought or of action, for example, "Do you have a light in your room at night?" "Do you ever wish you had never been born?" But a number of items deal with more general tendencies, as illustrated in the questions, "Do you usually know just what you want to do next?" "Do you have a hard time making up your mind about things?" and "Is it easy to get you cross over very small things?" Some of these same tendencies are also measured in investigations of introversion.

Now studies which have been made on emotional stability (or instability) show that the various "nervous" symptoms and tendencies are possessed in different degrees and combinations by different individuals. No individual, child or adult, is entirely free from all these symptoms. In an unselected group of children or adults a small number will be found relatively free from the symptoms, and a correspondingly small number will exhibit a great many, while most individuals in a group will fall within a middle range. There is a gradual progress from emotional stability to emotional instability, as measured in these questionnaires. Hence emotional stability is a matter of degree. It does not represent a distinct type, but rather a loosely organized tendency which we might call a type-trait, or simply, perhaps, a trait of a more general order than such traits as punctuality and obedience.

Although it is clear that there are significant larger groupings of traits within the total personality, and that these represent different levels or orders of organization, there seems to be no good evidence for the existence of distinct personality types. What we have said of the objections to considering the extrovert and the introvert, the emotionally stable and the emotionally unstable as types probably applies equally well to other proposed types. Where thorough statistical studies have been made, the supposed types have turned out to be extremes of a fairly normal distribution, and well defined boundaries between the various possible ratings or scores are not found. Thus in any unselected group there would be very many more exceptions than individuals who even approximated the types. This being the case, it

is highly questionable whether the concept of types is a useful one for psychology.⁶

It is an interesting question to what extent traits of higher levels, or type-traits, are present in young children. Leslie R. Marston has shown that tendencies toward extroversion and introversion, as measured by ratings on 20 pairs of traits based on a standard list of Freyd's and by a series of objective tests, are well marked in preschool children.⁷ His directions to the raters of the children were purposely so phrased as to discourage median ratings, and hence his curves show a bi-modal distribution, which, since artificially produced, does not afford evidence for two distinct types. Nevertheless the average ratings made independently by two to five observers for each child show in an interesting way the difference in estimated amount of introversion from trait to trait. Figure 42 shows how far from consistent the tendency toward introversion or extroversion is likely to be for an individual child. Notice, for example, that one subject is rated at almost the extreme of extroversion on trait number eight (showing self-confidence and initiative); while on trait number 11 he is rated as definitely introverted (meaning that he is sensitive and easily hurt).

Marston devised five experimental situations to obtain objective tests of prominent traits among the 20 pairs. For example, compliance and its opposite were measured by the child's reactions to the experimenter's request that he open a box with fastenings so complicated that the task was impossible for him; and degree of interest in external objects was measured by recording the number of stops made by a child when allowed to explore an animal museum which he had never seen before. The responses of the child to the five carefully standardized situations were scored according to a definite plan as to degree of introversion or extroversion shown. Marked individual differences were found. The

⁶ See W I and D. S Thomas, *The Child in America*, Knopf, 1928, pp 480-489, for a discussion of Kretschmer's theory of types, and of studies inspired by his work

⁷ L. R. Marston, "The Emotions of Young Children: an Experimental Study in Introversion and Extroversion," *Univ of Iowa Stud in Child Welfare*, 1925, III, No 3, 7-99. See also N L Perkins, "Personality Studies in a Nursery School Group: a Critique of the Marston Questionnaire," *Amer. J. Orthopsychiat.*, 1931, 1: 193-221.

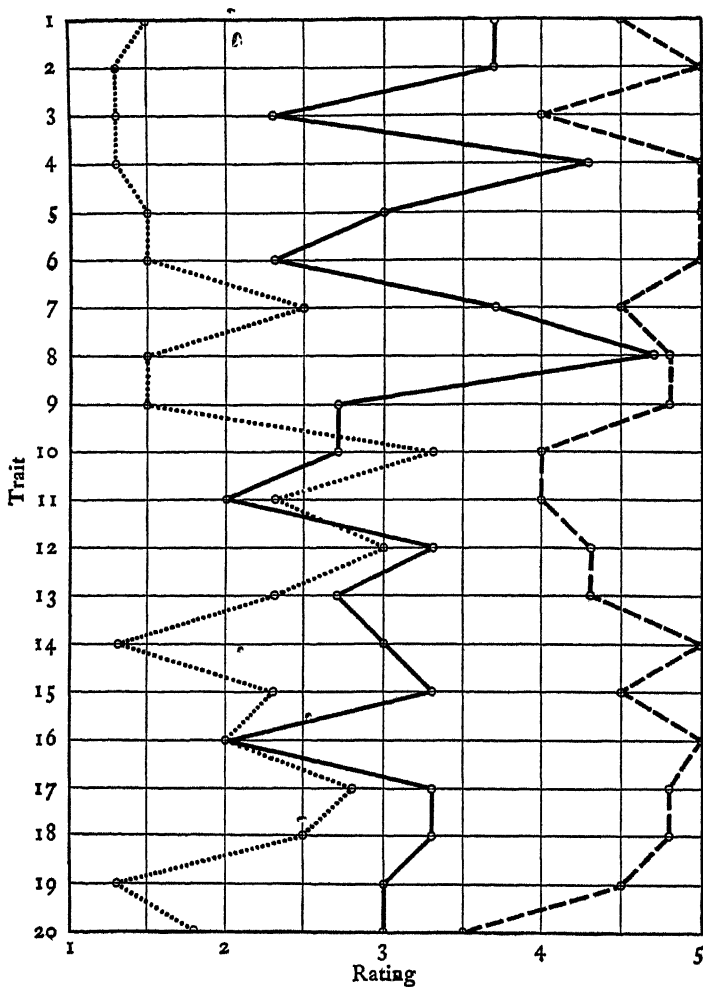


FIG. 42. INDIVIDUAL PROFILES OF THREE BOYS

One boy tends toward introvert ratings (.....), one toward median ratings (———), and one toward extrovert ratings (-----). The light vertical line through the center of the chart represents the theoretical balance between introversion and extroversion, rating 3. The left and right boundaries represent respectively the extreme of introversion, rating 1, and the extreme of extroversion, rating 5. The profiles connect the points on each of the twenty lines corresponding to the average scores on the respective traits.

(Reproduced by permission from "The Emotions of Young Children," by Leslie R. Marston, *Univ. of Iowa Studies*, Vol. III, No. 3, 1925.)

fact that the performances of the group of children on the various tests showed intercorrelations⁷ ranging in general from $+.30$ to $+.50$, and that there were correlations averaging about $+.50$ between test scores and ratings, shows that there were in these children more or less consistent groupings of the 40 traits into type-traits which may be called extroversion and introversion.

The fact that as definite interrelationships among traits as these were found well established among children between two and six years of age supports the opinion of leading psychologists that in the first five years the dominant trends of the personality are being established. Published case studies of young children, based on observation in schools and clinics, also support this generalization. Investigators are obtaining objective data on the social behavior of nursery school children which show striking individual differences in such behavior.

On the other hand studies reporting measurements of ratings on the same children after the lapse of months or years reveal much change in individual children: personality traits are still flexible, still in process of formation. This statement is particularly well illustrated in Murphy's report of changes in sympathy and other traits.

It appears, however, that there is considerable ordering or association of traits, and that this ordering is under way in the earliest years. Experimental and clinical studies, supplementing keen observation in homes and schools, already enable us to point out what are probably some of the most important factors determining the shaping of basic traits and their organization into more general trends.⁸ Our knowledge on many points is still far from exact. We are, in fact, barely beginning research in this wide and important field—but we may find helpful guidance not only in the systematic research which has been done but in generalizations based on clinical and other first-hand observation.

⁸ See H. Hartshorne and M. A. May, *Studies in the Nature of Character*, particularly Vol. III, *Studies in the Organization of Character*, also, for a genetic study of one trait, M. A. McLaughlin, *The Genesis and Constancy of Ascendence and Submission as Personality Traits*, Univ. of Iowa, Stud. Educ., 1931, 6, No. 5.

SPECIAL CONDITIONS INFLUENCING THE DEVELOPMENT
OF TRAITS

In summarizing the conditions which influence the development of traits we shall, in the absence of experimental analysis, have to use for the most part popular terminology in referring to those traits. We shall use the terms trend or tendency interchangeably with the word trait, and we shall make no attempt, in this rather general treatment, to deal separately with traits of lower or higher levels.

Physical Conditions.—Among conditions favoring the development of certain traits rather than others, those which may be classified as physical factors are sometimes of great importance. General good health and what we call, rather vaguely, "vitality," may be a factor in the development of such characteristics as cheerfulness, impulsiveness, optimism, and aggressiveness. A low degree of vitality, on the other hand, may be one among other conditions which favor, according to the circumstances, lack of confidence, introspective tendencies, moodiness, slowness, dignity, sadness, or pessimism. Although the weak and the ill may be mentally alert and aggressive, and sound and healthy people may become moody or depressed, listless, and lacking in confidence and initiative, still good physical condition is certainly a powerful factor in the development of mental buoyancy.

Very often peculiar physical defects have a noticeable effect on the growth of personality. The psychoanalyst Alfred Adler has urged that a person with some special physical defect unconsciously tends to compensate for it, or as we might prefer to say, to overcompensate for it, by developing some complementary trait.⁹ Thus a short person may be loud-voiced and dignified. A child who is or who thinks he is ugly, stunted, or otherwise inferior physically to his companions develops compensatory trends which may shade over into delinquency or abnormality. Adler has maintained that these physical defects are usually related to defects in the sex organs, and that the unconsciously exerted effects of inferiority in the sexual sphere profoundly affect the growth of personality. According to Adler, since all children are im-

⁹ Alfred Adler, *The Neurotic Constitution*, Moffat, Yard, 1917, *A Study of Organ Inferiority and Its Psychical Compensation*, Nerv and Ment Dis Publ, 1917.

mature sexually and undersized in comparison with their parents, they have a certain "inferiority complex" which threatens normal personal development unless wisely dealt with.

This concept of physical inferiority as a factor in the development of compensatory traits has illuminated some obscure problems of personality. Psychologists have found it usefully applicable in many cases, but in their hands the theory has undergone important modifications. They see no reason for limiting the discussion to organic conditions. A sense of inferiority related to other than physical defects or failures may have important effects on a child's development. Clinical and case study has shown that in certain children failure to keep up with the others in school, lack of popularity, sense of moral guilt, and other non-organic factors may favor unwholesome compensatory activities. Again, organic inferiority by no means inevitably results in an inferiority complex, although there is good experimental evidence that it tends in that direction.¹⁰ The theory that all children tend, as inferior to their parents, toward compensatory adjustments, is generally regarded as far-fetched. Nor is the implication justified that compensatory adjustments are undesirable as such. In general, overcompensation which is not recognized for what it is, is likely to be unwholesome, but some compensatory traits, even though unconsciously developed, may be highly desirable—as, for example, the sweetness of manner sometimes, but not always, found in very plain children. Sometimes the deliberate strengthening of an existent trait for purposes of compensation results in desirable improvement in personality.

It is clear that the effects of a physical defect on personality development will depend upon a good many circumstances, including the general physical condition of the child, his intelligence, the attitude which various others assume toward his defect, and the attitude which he is encouraged to assume toward the attitudes of others. One child, ridiculed at school because of a disfiguring birthmark, may become self-conscious and socially timid. Another with the same sort of defect may respond with good-natured counter-

¹⁰ Hanna F. Faterson, "Organic Inferiority and the Inferiority Attitude," *Jour. Soc. Psychol.*, 1931, 2: 87-101.

attacks, and be all the more popular with his fellows because of it. Still another, though he does not actually hear taunts or pitying comments by others, may imagine them, and unconsciously develop an arrogant and superior manner as a way of maintaining himself in the social group. Obviously a good deal of control is possible in this matter.

According to current popular tradition, certain types of physical features are associated with personality traits. This theory is implied in the expressions "aggressive brow," "weak chin," "deep-set, far-seeing eyes," and the like. It is sometimes assumed that a small-boned person, or one with fine, soft hair, is capable of finer feelings than a large-boned person, or one having coarse hair, that full lips mean sensuality, and that small eyes mean greed. Some have claimed that there are important differences in personality traits between blondes as a class and brunettes.

Where scientific investigations of such theories have been made, the results have shown them to be without foundation.¹¹ Profiting by the lessons learned from the collapse of the older phrenological doctrines and the more recent demonstration of the falsity of the Lombrosian doctrine of the physical stigmata of delinquency, we have good reason to refuse to entertain such theories as reasonable hypotheses. Because of their social importance, however, they should be carefully investigated. This is because of the harm that may come to individuals and to members of certain racial groups through mistaken attitudes based on these prejudices. The author knows of one person who suffered all through her girlhood from sensitiveness over her receding chin, which members of her family believed was a sign of lack of initiative as well as of inferior intelligence. That this girl actually did grow up somewhat lacking in initiative and became easily discouraged at school in spite of her good work her friends believe was caused in part by the attitude of her family. Certainly she has at least average intelligence. As an adult, she has to some extent overcome her early "inferiority complex," but it has greatly handicapped her.

We do not have accurate knowledge about the relation be-

¹¹ See for example D. G. Paterson, and K. Ludgate, "Blonde and Brunette Traits, a Quantitative Study," *Jour. Pers. Res.*, 1922, 1, 122-127, and D. G. Paterson, *Physique and Intellect*, Century, 1930.

tween ductless glands and personality traits. It is known that excessive secretion of the thyroid is connected with over-emotionality and general overactivity; and it is probable that other glands than the thyroid also have important influence on personality. But as to what is the nature of such influences, how they may be exerted, how they vary from person to person, and what degree of control is possible, we know at present little or nothing. Certain popular books, purporting to tell how glands regulate personality, may well be read as a sort of intellectual play, but it is to be remembered that they are highly speculative. We may entertain the hope that sometime a more exact knowledge will enable considerable control in the case of children suffering from remedial under- or over-functioning of glands, a malfunctioning which may affect personality as well as physical development. It does not seem likely that glandular treatment will ever prove an important means of influencing the development of personality traits in normal children, although a knowledge of certain relationships between glands and personality which may some day be available may quite possibly aid in the attainment of greater understanding of individuals.

Among physical conditions which have an important influence on the development of personality are the growth changes of puberty, including the functioning of sex glands as well as general growth in the sex organs. There is no evidence that any new personality traits are "born" at this time, as G. Stanley Hall suggested, but certain ones which involve positive attitudes toward other people are undoubtedly often greatly modified or strengthened. Newly-developed emotional responses to internal stimuli now come to be aroused by those individuals or those classes of people toward whom the child has already been trained to respond positively.

A normal adolescent is likely to develop very strong emotional attachments, if he has been properly trained, to members of the opposite sex, and in comparison with this emotion the love which he has felt for his parents and members of his family may now seem slight. But even if there seems to be a superficial cooling toward the family, the love is still there and, though differently expressed, it may become pe-

cularly heightened.* It is not uncommon for the adolescent to respond with greatly heightened interest to any other groups or classes of people whom he has learned to appreciate—let us say to children, to the feeble or the old, to people in other countries, or to humanity in general. Especially if during his adolescent years he receives teaching which points out the needs of these other people he may become passionately devoted to their interests. Thus at this time such traits as loyalty, sympathy, tolerance, and unselfishness—altruism in general—may undergo a rich development.

The youthful and often extravagant enthusiasm engendered at this time is usually recognized as symptomatic of a "stage" through which the boy or girl is passing; and it sometimes happens that unsympathetic adults maintain a coldly analytical attitude towards the child, make fun of him, or else show indifference to his enthusiasms. Such an attitude may arouse in the youth rebelliousness and intolerance of adult ways; it may encourage a tendency toward introverted attitudes—seclusiveness, daydreaming, and aloofness from others; or it may foster a disillusioned cynicism.

Among other traits which may be augmented or modified in adolescence are aggressiveness, related to the feeling of power and strength connected with physical changes, moodiness as a result of complex and shifting alterations in emotional tone, and self-consciousness, shyness, and depression arising from sexually-based conflicts. Quite possibly the intensity of the idealism prevailing in some adolescents is due in part to unconscious overcompensation for what seem to the individual to be shameful sex feelings.

This brief reference to the importance of the physical changes of puberty as factors in the development of traits suggests that in adolescence a great deal may be done, through wise guidance, in the way of developing and organizing important special traits for which a good foundation has already been laid.

Differences in Intelligence.—Extensive study, in recent years, of bright and dull children indicates that intelligence is by no means so important a factor in personality as has often been supposed. The long prevalent assumption that the exceptionally bright child is likely to be not only inferior

physically, but unduly serious, one-sided in his interests, introspective, and more or less unpopular with his fellows, has not been supported by factual investigations. On the average, very bright children are found to be superior physically to ordinary children, and they seem also to have the same general range of personality traits as the latter. Although they tend to prefer more intellectual types of amusement, their play life is entirely normal, and there is no evidence that they are, on the whole, inferior in social adaptability and in popularity among other children.¹²

In individual cases, of course, high intelligence may be a factor in the growth of certain traits. If a child is much superior in intelligence to brothers and sisters, or to one or both of his parents, he may, if the family situation is "favorable," develop such traits as conceit, "bossiness," or selfishness. On the other hand, in certain cases adults, fearful of the development of such traits, may, by keeping the child aware of his defects in other respects, foster a sense of inferiority and social inadequacy. Thus intelligence may indirectly condition personality development.

A more acute problem than that of the bright child among average or inferior children is the situation of the average or dull child of very bright parents, or one who has a brighter sister or brother. Such a child, as is illustrated in case studies over and over again, may develop feelings and ideas of inferiority which may profoundly affect his life. The situation is likely to be especially unfortunate if the child is expected to maintain a standard set by a superior brother or sister, to follow in the steps of his brighter parents, or to achieve their unrealized ideals. Children are being constantly urged to school and vocational accomplishments literally beyond their ability, and sometimes the consequences of such a policy are serious. On the other hand, in view of the impossibility of determining just what is the native capacity of the child, one might urge that it is better to run the risk of expecting too much than too little.

If the bright child has an essentially normal personality there is evidence that so also has the dull child, providing he

¹² L. M. Terman, *Genetic Studies of Genius*, Vol. I, *Mental and Physical Traits of a Thousand Gifted Children*, Stanford Univ., 1925-26; L. S. Hollingworth, *Gifted Children*, Macmillan, 1926

is above the level of imbecility or idiocy. In a study of the adjustment during a five-year period of 68 retarded children, half of whom had I.Q.'s below 90 and eight of whom had I.Q.'s below 50, Kinder and Rutherford found, contrary to their expectation, that there was relatively little correlation between the degree of retardation and social adjustment.¹³ Powers applied the Marston introversion-extroversion rating scale to 89 mental deficientes aged 11 to 16 years, with a median I.Q. of 64, and found almost perfect correspondence with Marston's results.¹⁴ The range and general organization of personality traits is shown by studies like these to be essentially the same for dull and even very dull as for normal children. A recent study suggests that while this is true, dull children might be expected on the whole to develop socially undesirable traits in greater degree than bright children.¹⁵ Clearly, however, the development of personality traits in children is to a considerable extent independent of the I.Q.

Although dull children may score significantly lower *on the average* in some traits, case studies and experimental investigations indicate that dull and even very dull children probably have essentially normal feelings and normal capacity for developing the ordinary range of personality traits. We might suggest that the chief effect of lower degrees of intelligence on personality traits would not be likely to make itself felt until the years of early adolescence, for it is possibly not until then that the child himself takes any very active part in rationally controlling the development of his personality. On this theory we should expect that the older children and adults who have less than average intelligence would tend to have less effectively integrated personalities than more intelligent individuals.

On the whole, however, we may conclude that the degree of intelligence possessed by a child is not in itself a decisive factor in the growth of the ordinary personality traits, although it may have a good deal to do with the effectiveness

¹³ E. F. Kinder, and E. J. Rutherford, "Social Adjustment of Retarded Children," *Ment. Hygiene*, 1927, 11: 811-833

¹⁴ N. E. Powers, "An Application of the Marston Introversion-Extroversion Rating Scale," *Jour. Educ. Psychol.*, 1928, 19: 168ff.

¹⁵ E. W. McElwee, "A Comparison of the Personality Traits of 300 Accelerated Normal, and Retarded Children," *J. Educ. Res.*, 1932, 26: 31-34.

of integration in the later years. But the attitude taken by the parents, by teachers, or by the child himself toward his intelligence as compared with that of others is likely to be, in many cases, very significant. The importance of the I.Q. has undoubtedly been exaggerated by psychologists and by parents in recent years, and it is a hopeful sign that interest has shifted toward problems of personality.

Position in the Family.—It is often assumed that position in the family is a decisive factor in the development of special traits. For a good many years writers have dwelt on the dangers to which the only child is exposed. Brought up with more adult than child companionship, the center of attention, spoiled by overaffectionate parents, the typical only child is said to be selfish, lacking in initiative, and overemotional, with a tendency toward nervous instability and less than ordinary ability to get along with others. The oldest child in a family is likely to be, some writers have said, domineering and aggressive, a younger child is likely to have an "inferiority complex," while the youngest again is exposed to the dangers of spoiling and overattention. There has been some disagreement as to the characteristic traits, but the foregoing statements represent common opinions.

Recent statistical investigations, which are the final test of the validity of such generalizations, have shown that the importance of the factor of position in the family has been exaggerated. Studies by means of ratings and tests of groups of only children from kindergarten to college indicate that *as a group* they are essentially normal. But it is significant that some investigators have found more instability of mood among only than non-only children, and a number agree in finding the only children more aggressive and self-confident.¹⁶ We may conclude that the great dangers to which the only child is subject are largely imaginary, and that intelligent parents by the exercise of forethought and care can guard against those that do exist.

Nor does statistical study of other "positions in the family" show that they are compelling factors in the develop-

¹⁶ F. L. Goodenough and A. M. Leahy, "The Effect of Certain Family Relationships upon the Development of Personality," *Ped Sem & J. Genet Psychol*, 1927, 34 45-71; N. Fenton, "The Only Child," *J. Genet. Psychol*, 1928, 35 546-556.

ment of special traits. The study by Goodenough and Leahy of 293 kindergarten children rated by teachers on a number of personality traits including selfishness, social adequacy, and the like reveals insignificant differences between oldest, middle, and youngest children on nearly all the traits. The oldest children showed slightly greater tendency toward lack of aggressiveness, the middle children the same tendency in a less degree, and the youngest children no outstanding characteristics. Bender in a study of college students found no statistically reliable correlations between scores on the Allport ascendance-submission test and position in the family.¹⁷

While experimental studies of the effect of position in the family on personality traits are, as yet, few, and the evidence conflicting, one may still conclude that the importance of the influence of the other "positions in the family," as well as that of the only child, has probably been exaggerated. These statistical findings should not, however, blind us to the fact that in individual cases circumstances connected with position in the family may be very important. But the large number of other circumstances with which this is associated and which differ greatly from child to child prevent us from making any confident general statements as to its rôle.¹⁸

"Racial" or National Differences as Factors in Trait Development.—There seems to be no denying, in spite of the lack of comparative statistical investigation, that significant racial and national differences in personality traits do exist. That the Chinese are on the whole more polite than native white Americans, Negroes more submissive, the French more vivacious in manner, and the American Indian more stolid, we may, because of almost universal agreement on these points, assume. About a good many special characteristics attributed to various racial and national groups we should, however, be skeptical until more satisfactory evidence is at hand. Those who judge usually have much better acquaintance with one of the two groups compared than with the

¹⁷ F. L. Goodenough, and A. M. Leahy, *op cit*; I. E. Bender, "Ascendance-Submission in Relation to Certain Other Factors in Personality," *Four Abn and Soc. Psychol.*, 1928, 23. 137-143

¹⁸ See H. E. Jones, "Order of Birth," chapter 13 in the *Handbook of Child Psychology*, Clark Univ. Press, 1933.

other, and are also likely to be influenced by preconceived ideas based on unreliable tradition.

Granting the existence of racial and national differences in personality, we may ask what is the likelihood that they are based on hereditary factors. Where such factors exist it would be helpful, from the point of view of those who bring up children, to know about them. If they favor desirable traits, we are glad to have an ally in nature, if undesirable traits, we wish to be all the more alert that we may exercise control from the start. Suppose we find that an undesirable trait which has been thought to rest on hereditary bases is really the result of special environmental conditions. That will lead us to put emphasis on prevention through regulation of those special conditions. Therefore, although we realize that no mental trait is ever inherited as such—that both heredity and environment must be concerned in its development, and that in no case is a fatalistic attitude called for—still the interest in the rôle of hereditary factors in personality traits is to some extent justified.

Now in the case of racial differences in personality there seems to be no good reason for supposing that hereditary factors are of decisive importance, or likely to have much influence on the growth of personality in a child brought up away from his natural environment. There are certainly inherited differences among the various peoples of the earth in physical features such as color of hair, height, and the like; and it may be found that there are also some significant differences in physiological functioning which favor certain personality traits. We know of no such definite correlated differences at present. But assuming that they exist, it would not be necessary to suppose that they are dominant factors in the growth of personality traits, while on the other hand there are reasons for supposing that special environmental factors are very important influences in such development. In the various parts of the world there are many and often very large differences in physical environment, and still greater differences in the social environment in which a child is brought up—differences in national traditions and ideals, in education, in political organization, in economic opportunities, and in social position as reflected in the regard in which the group is held by other groups.

This last point is often neglected. A child of a colored professor in a Negro university is brought up, if he sees white people at all, in a significantly different social environment from that of a white child of his own social class. In certain children the social stigma of being called a nigger, a dago, or a sheeny may result, according to the circumstances, in the development of submissive attitudes or a sense of inferiority, in rebelliousness, "temper," or spitefulness, in compensatory boastfulness, or in an assumed attitude of flattering subservience.

It would be interesting to compare the traits of very young children of different "racial" groups when the environment has had less chance to affect personality. Scattered observations point to the likelihood that babies and very young children of different races are very much alike, that Chinese babies are no more polite or passive than American babies,¹⁹ Negro babies no more submissive, and Indian infants just as lacking in stolidity.²⁰

It might be urged that the existence of great differences in native intelligence must make for personality differences in races. But we have seen that the I.Q. has less effect on the development of personality traits than we might suppose, and would be likely to affect the rational organization of traits rather than the form of special traits. Besides, in spite of long investigation we have not succeeded in obtaining positive evidence either for or against the existence of marked racial differences in native intelligence; and though large differences in tested intelligence are found, there is so much overlapping that it would be unfair to judge the probable capacity of individuals in the light of these general findings.²¹

On the whole, since we have no definite evidence that native factors are potent in producing racial differences in per-

¹⁹ A study by G. Ding and A. T. Jersild, "A Study of the Laughing and Smiling of Preschool Children," *Ped Sem & J Genet Psychol*, 1932, 40: 452-472, indicates that young Chinese children smile and laugh as frequently as American children of European descent.

²⁰ Charlotte Buhler, in her article "Die Ersten sozialen Verhaltensweisen des Kindes," (*Quellen und Studien zur Jugendkunde*, No. 5), reports no differences in social behavior in infants of different races.

²¹ F. L. Goodenough, "Racial Differences in the Intelligence of School Children," *Jour Exper. Psychol.*, 1926, 9: 388-397; Otto Klineberg, *Race Differences*, Harper, 1935.

sonality, but do have convincing reasons for recognizing the importance of environment, especially in the form of social heredity, it would seem wise and sensible to assume that children of all races probably possess about equal potentialities for both good and bad traits. Certainly we can never be sure that children of any particular race or nation lack the capacity for developing a desirable trait, until we have given them a good chance to develop it. And we have no reason for confidence that the children of the more "favored" races would not, if brought up under primitive conditions, develop primitive traits.

Sex Differences in Personality Traits.—There seems no good reason for questioning the essential correctness of the common opinion that girls and women are, on the average, somewhat more emotional than boys and men, more tender and sympathetic, more tactful, and quite possibly more inclined to be jealous, spiteful, and intolerant.²² But there is reason for questioning a common assumption that such differences are innate and inevitable. We have found after extensive investigation covering many years that the two sexes do not differ in general intelligence, and that although in certain special abilities such as arithmetical and mechanical abilities there are some differences on the average at certain ages, these differences are so slight that they may safely be ignored for educational purposes.²³ These findings, disproving at last a tradition of ages that women have inferior intelligence, suggest that we may also find, sometime, that innate differences in factors which condition personality traits are equally negligible. It does not seem at all improbable, to be sure, that certain differences in traits may be correlated with some of the innate physical and physiological differences between the sexes; but even if this is true, there are reasons for thinking that such differences are probably slight.

The special social conditions to which girls are usually subjected from babyhood are certainly very important fac-

²² B. Wellman, "Sex Differences," chapter 15 in the *Handbook of Child Psychology*, Clark Univ. Press, 1933.

²³ F. L. Goodenough, "The Consistency of Sex Differences in Mental Traits at Various Ages," *Psychol. Rev.*, 1927, 34: 440-462; A. L. Winsor, "The Relative Variability of Boys and Girls," *Jour. Educ. Psychol.*, 1927, 18: 327-336. See also B. Wellman, *op. cit.*

tors, and possibly the sole determining factors, in the development of the typically "feminine" traits. Dr. Floyd Allport has cogently analyzed the process by which differences in personality between the sexes are built up, pointing out that from the first the girl is denied opportunities for personal development which are open to the boy, and that under the pressure of man-made standards of conduct human feelings rather than objective considerations are likely to become her guide. As adolescence approaches, these special restrictions and special influences become more compelling. The fruits of inhibition, conflict, and overshielding are seen in the traits of the mature woman.²⁴ As Allport implies, the gaining of political and economic freedom in maturity will not give a woman personal freedom from the bondage of those feminine traits, which, deeply grounded and inextricably interwoven with the other aspects of her personality, can only be materially changed through a very radical course of reeducation. Only through a different kind of training from birth on can such undesirable "feminine" traits as over-docility and emotionality be controlled.

It should be pointed out that boys too have suffered from the traditional theories of sex differences. There seems to be no reason why boys should not develop the traits of sympathy, tact, and tenderness which are so valued in women, or why they should be expected to manifest coarseness, destructiveness, and lack of appreciation of fine human relationships. Perhaps it is as unwise to make fun of little boys for playing with dolls or to call them sissies if they show a love for music, as it is to call a girl a tomboy if she climbs trees or shows an interest in electricity.

Individual Differences in Personality.—Individual differences in personality traits are undoubtedly based in part, as the preceding discussion has implied, upon differences in physique, health, general and specific learning abilities, and the like; and such differences are often determined largely by hereditary factors. Environmental factors are also, of course, concerned in the development of all traits and are much more important in some than in others. But the popular faith in the power of heredity as a sole determinant is so strong that this point will bear elaboration.

²⁴ F. Allport, *Social Psychology*, 1924, 345-353.

A stock argument is that since children in the same family environment have very different personalities, these differences must be ascribed to heredity. The fallacy here lies in supposing that any two children in the same family have a common environment. The social environment is always different because each child is part of the environment of the other; and also wherever there is a difference in the age the two children are necessarily treated differently. The attitudes of other members of the family toward the two as well as those of outsiders are likely to differ, and the child responds quickly to such attitudes. Case studies of children of the same family have shown very clearly in what strikingly different social environments the various children of a family may grow up.²⁵ Moreover no two children, unless they are as close together as Siamese twins, are exposed to quite the same physical environment. Sometimes even a single experience, if it makes a deep impression, may profoundly affect the personality of a child, and one child in the family may undergo such an experience, let us say a severe shock because of an attack by an animal, or an accident or illness requiring special treatment, while others escape it. Special experiences, to say nothing of the countless minor variations in environment which ceaselessly affect the child, thus make each child's world different from that of the others.

Summarizing, we may say that while hereditary factors are present in all traits, and while in the case of some traits and of some individuals these hereditary factors are undoubtedly more important than in others, still developed personality traits are largely the product of individual experience. We cannot expect by providing a favorable environment materially to alter a child's general intelligence, unless in exceptional cases; but we may expect that the sort of social environment we provide for him by way of teaching, training, and example will be of great importance in shaping not only the main trends but also special traits in his personality.

Regardless of the extent to which heredity or environment is responsible for the striking individual differences which form the raw materials of personality, parents and

²⁵ See for example Blanche G. Weill, *The Behavior of Young Children of the Same Family*, Harvard Univ. Press, 1928

teachers may utilize these differences in varying ways, according to the abilities and the needs of the particular child being dealt with. We would insist that any normal child has potentialities for the development of the widest conceivable range of traits, good and bad; and that no presuppositions as to the presence or absence of possibilities for developing any trait should influence our efforts at training. But if we wish a child to develop a personality which will enable him harmoniously to satisfy his own motives as an individual in society, then it follows that we will encourage any spontaneous manifestations of individual talent or inclination or ways of doing things which do not conflict with the satisfaction of his major needs. In other words, we shall try to develop the traits of originality and independence in thought as in overt action.

Special interests, recreational, vocational, intellectual, or æsthetic, and special ways of thinking and of doing things, will, whether based largely on native factors or on the ever-varying experiences of the child, inevitably color the personality traits which he develops. Three children of a given age may all be equally aggressive, yet their specific ways of performing the aggressive acts are likely to be very different. One child's thoughtfulness may be shown in quiet matter-of-fact behavior, another's in demonstratively affectionate ways. Yet there may be as much real affection in the first child as in the second. Then, too, the way in which personality traits are grouped and related will inevitably vary from child to child, and in the same individual now one trait and now another will be in evidence according to the circumstances. In any effort to encourage individuality, therefore, we shall not only have an ally in the child's unique heredity, but shall be aided by the natural exigencies of living. In fact, of course, the difficult thing is not to develop individuality, but to know how far to go in that restriction of it which is necessary for the attainment of an effectively socialized personality.

Our summary of special conditions which may influence the growth of personality will have suggested how it is that such conditions may give rise to problems and motives, which, persistently or recurrently present, make for the association of habits and attitudes into traits, and of traits into still more general tendencies. Let us, for the sake of con-

crete illustration, take the case of a little child with a stern and puritanical father who frequently scolds, lectures, and punishes him. The child learns, in order to forestall punishment, to obey the father instantly. He also learns to be very quiet and low-voiced when with adults. He acquires a habit of starting slightly when someone speaks suddenly. Since he is often criticized for lapses in manners and morals, he becomes so fearful of making mistakes that he is very self-conscious. Finally the fact that he is repeatedly checked when doing something he likes creates in him, by conditioning, periods of depression, and he becomes a moody child, suddenly relapsing from cheerfulness when some stimulus or idea occurs which is connected with disagreeable experiences. This analysis, unduly simplified as it is, yet shows how the recurrence of certain types of problematic situations, with a common motive (let us say in this case, fear), may give rise to habits and attitudes which are more or less closely related. In this case the type-trait, if we wish to call it such, may be thought of as introversion, and various lower-level traits which comprise it are timidity, self-consciousness, moodiness, over-conscientiousness, submissiveness, and "nervousness." The continued presence of the stern father, the repeated arousal of the emotion of fear, are thus unifying factors tending to shape this boy's personality.

In another case the trait of aggressiveness was developed in a boy partly as a result of his resentment at the treatment which members of his family received from outsiders. Hearing his parents spoken of as shiftless, and being made to feel in various ways, as he grew up, that no one expected the children, of whom he was the oldest, to amount to anything, this bright boy developed a strong desire to "show them." As a schoolboy he daydreamed of the time when he would return to the town with more money and more reputation than anyone living there. In spite of many difficulties he pushed ahead until he finally more than realized his daydream. His is an aggressive personality. Besides ambition it is characterized by the traits of loyalty, pride, independence, and initiative, all developed in a total situation in which certain attitudes of others were a dominant motivating factor.

Considering the extreme complexity of inner motivation

and the changing variety of environmental conditions, we shall expect to find much overlapping among personality traits. Thus self-consciousness may be a factor in submission and also in introversion; the tendency to jump at sounds, in one child, is connected with his submissiveness and is also a symptom of nervous instability. In fact, every act and every trait is indirectly related to every other act and every other trait, since it is a human individual organized as a functional unit who is behaving. The divisions between habits and traits and type-traits are relative and shifting. They are not well defined entities, but only functional relationships which are distinguishable in a total of adaptive activity.

THE INTEGRATION OF PERSONALITY

The physical unity of the organism, with its elaborate provisions for integrative activity, is a basis for a unity in behavior which is apparent almost from the first. The chief tissue needs, as well as numerous and complex acquired motives, provide enduring bases for the development of special trends, for systems of reactive possibilities which are all related because associated with a common underlying condition. But experiences which are not thus related to a common motive are also associated, through occurrence together in place or time; and as ideas become important in mental life, situations which are merely thought of together become as closely associated as if they had been perceived together. Thus behavior, explicit and implicit, is inevitably unified.

But unity does not necessarily imply integration. The three-months-old baby, cooing, crying, waving its hands, smiling and kicking, is a unit, and in its behavior we see promise of future traits. The two-year-old, as described by Miss Verry, who picked up a board and smilingly whacked a playmate over the head with it, then turned calmly to other play, was still more of an individual. In both of these the lack of integration is a reflection primarily of lack of experience.

The woman who melts into tears on reading sentimental novels, and who is active in charity work, but who makes her husband miserable by constant complaints and is half

the time harsh to her children and half the time indulgent, has attained characteristic personality traits which will probably be permanent. Knowing that she was a spoiled child, and that she so idolized her father that no one now can take his place, we can understand that her present behavior is probably logically related to her earlier experiences. But her mental life, though it is unified, we should hardly call integrated. The same thing may be said of the paranoiac in the asylum whose whole interest centers about the threshing machine which he invented years ago to help save the farmers of the West from poverty, but which jealous enemies have prevented him from patenting. Convinced of his complete superiority to all his enemies he is not only resigned to his martyrdom in the hospital but happy in the leisure for thought and talk about his great idea, and in the appreciation which he has got at last. His mental life is appallingly unified.

We may call a personality integrated to the extent to which it is understood and rationally organized by the individual himself. Since reflective thinking always originates in a problematic situation, this conception implies that integration depends upon the persistence of motives which are in process of satisfaction. We have seen that traits represent systems of reactive possibilities built up in the process of learning how to adjust to recurrent problematic situations of a similar nature; and how larger groupings of traits are developed in connection with life situations peculiar to the individual child. The traits and groupings of traits once formed, themselves function as motives which play a part in the further integration of experience. Personality may thus be conceived as a hierarchy of traits, the final integration of which implies a dominant motivating basis in some aim for the conduct of life as a whole.

According to this conception integration in personality is a matter of degree. It is a slow process, beginning in early childhood, continuing indefinitely, and never complete. The building up of a single trait proceeds at first on the basis of what we may call associative syncretism. The various aspects of a trait are unified through experience, but the child does not understand the relation between various habits and attitudes which comprise it, or the reasons for acting as he

does. It is only when he begins to generalize from his experience, and standards, desires, sentiments, purposes, or ideals begin to take shape, and when he learns to judge new situations in the light of these generalizations, that integration is possible.

We may see the beginnings of this "thoughtful" organization of experience around motivating ideas in very young children. It is reflected in such scornful remarks as "He isn't nice — he sucks his thumbs!" and "My father doesn't do that way!" One little three-year-old girl, out walking with her mother, listened with interest to the latter's conversation with a friend who stopped them on the street. "How pretty your little girl is!" the friend remarked. At this the child stepped in front of the lady, drew herself up, and said, slowly and with emphasis, "No, Lucy not pitty — Lucy jus' good an' best!" The reader will not be surprised to learn that as an adult this girl is indeed very good. Another little girl, a four-year-old, appeared greatly shocked at seeing her guest, aged two, rush across the room and snatch a sandwich she was not supposed to have. "Nancy, you mustn't do that! Nancy's a naughty girl!" she exclaimed. The mother explained that Nancy was too little to know better, but that she would soon learn. "Oh, but when I was little, I didn't do that!" insisted Betty. She was able not only to generalize, but to make a rational analysis of a new situation.

To the extent to which any trait is "thoughtfully" organized, and specific acts judged in the light of their general relation to a standard of conduct, integration is therefore being achieved. In early years there will be foci of integration, as it were, aspects of behavior which are organized around leading interests. But these will not be thought of in logical relation to each other: the unity of the personality will still be based on syncretism, we may say, rather than on synthesis. As the child acquires more general interests, however, as his personality is characterized by more inclusive and general systems of traits, there will be a basis for a more general type of organization. But according to our conception successful integration of the whole personality cannot begin until the child has acquired some conception of himself as an individual in relation to other people, and some gen-

eral idea or plan of what he wants to make of himself. Such an objective conception of himself the average child acquires slowly. Some, for lack of knowledge or of training or of sufficient innate intelligence, never acquire it, and hence can never have well-integrated personalities. They may as adults have desirable personality traits, and distinct individualities, but their outlook on life remains essentially child-like and naïve.

Even after that conception of the self has been acquired which provides the motivation necessary for complete integration, the integration does not follow as a matter of course. The task of organizing one's thinking and one's conduct in relation to a plan for life as a whole is very difficult. In fact, of course, so limited are the resources of human thought and so many are the difficulties, that a type of organization which is completely satisfying to the individual is rarely if ever achieved.

With the chief conditions which stand in the way of successful integration we have dealt in earlier parts of this book. Many types of adjustment acquired in early life may interfere with the satisfaction of later interests. Those which are earliest acquired are likely to be most serious. The main reason for the greater seriousness of these early experiences is that they are likely, especially if repeated or if profoundly disturbing, to become so intricately interrelated to later adjustments that any thoroughgoing attempt at reform involves a rather general reorganization of the personality.

The disintegrating effect of childhood fears is a factor in the difficulties of adjustment of many normal individuals, who often do not realize their source. An unusual case, that of Professor William Ellery Leonard of Wisconsin, whose childhood fear of locomotives and of leaving home, among other fears, profoundly affected his whole life, illustrates the mechanisms concerned, as well as the difficulty of treatment, and points to the great importance of careful preventive training. In *The Locomotive God*, Leonard gives a detailed and most interesting account of his years of effort to achieve a rational understanding of himself. The basic fear of a locomotive, acquired when he was less than three years of age, was the result of an experience which would seem entirely ordinary to most adults, but which was terrifying in

the extreme to this sensitive child, who lacked the equipment for giving it a rational interpretation. Later experiences while he was still a young boy added to the range and intensity of his fears. He is now, although brilliant and highly successful in his life work, still handicapped by irrational fears—unable, for example, to go more than a certain distance from his home. He has made some progress in understanding himself, but has not achieved a really successful integration.²⁶

We have seen that positive emotional attachments also may interfere, in varying degrees, with the achievement of integration. Extreme devotion to parents and members of the family fostered by too much attention and sheltering on the part of the parents, may, for example, interfere with normal adjustment in married life, and occasion conflicts with which it is very difficult to deal.

Over-strict training in habits of thinking is inimical to the rational growth of personality. Effective integration requires above everything a freely varied attack, and any conditions which favor the foundation of intellectual prejudices, "fixed ideas," or "logic-tight compartments," set up serious barriers to reasoning. These irrational habits of thought are often very difficult to deal with even after the individual recognizes their unreasonableness, because they are built up in connection with situations in which emotional factors are important, and because, therefore, they are parts of more general sentiments which are of dominant importance in the personality. For example, one's convictions about the abilities of certain foreign groups may be related to childhood dealings with rough immigrant youngsters in a city school; one's passionate belief in the badness of a certain sort of conduct may possibly be the unconscious outgrowth of unsuccessful attempts as a child to deal with it in oneself; and one's religious ideas may be sacred because they are those of beloved parents.

Conflicts resulting from over-rigid early training in thinking are common among adolescents in college, and adjust-

²⁶ W. E. Leonard, *The Locomotive God*, Century, 1927. See also W. S. Taylor and E. Culler, "The Problem of *The Locomotive God*," *Four Abn. and Soc. Psychol.*, 1929, 24: 342-399.

ment to them is not always obtained by rational thought. The individual may simply turn to some authority other than that of his early years, and continue his compartmental thinking. Or he may after a while lose interest because of absorption in other things which have come to seem more important. If the motivation is strong, however, he is likely to continue until he has achieved a solution which seems reasonable to him. Major conflicts of this type, such as that between certain religious beliefs of childhood and a scientific view of the world, may continue indefinitely. Rarely they may be so severe as to result in a temporary or even permanent disorganization of personality. Play and æsthetic activity are important in favoring integration, not only as "making the mind more fit for apprehending many things at once," (Spinoza) but in content, as furnishing helpful suggestions for the solution of problems and the resolution of conflicts. Without going into details we may call attention to the peculiarly integrative value of certain forms of play in making for that integration which involves the ordering of the whole personality with respect to some general plan. Daydreaming of the compartmental sort which achieves the satisfaction of isolated desires without reference to conduct as a whole may often in the long run be positively disintegrating; but there is a constructive type of fantasy which is of the utmost importance for the growth of personality.

When a child attains a conception of the sort of thing he would like to do, or the sort of person he would like to be, he tends to imagine himself as going through the activities involved, pictures their effects on others, and the rewards they will bring to him. In dwelling on the imagined activities he comes better to appreciate their significance, and to appraise other acts, as related to these; and thus the daydream serves both as a motivating factor in organizing his thought along definite lines, and as a stimulus to overt action when imagined situations present themselves. The small boy who has daydreamed of helping old ladies across the street, or of rescuing children from burning buildings, or of becoming a first-rate surgeon, is more likely to respond in kind in actual situations than one who has never entertained

these fantasies. We may raise the question whether a child could ever attain that plan for his life as a whole which is the starting point of true integration, if he were not encouraged to let his thoughts range freely, at times, beyond the bounds of immediately practical problems into a freer world of his own imagining. It is in that world that the child, an artist for the time being, forms the pattern for his own life.

Art in general, as involving satisfying adjustment to many problems which cannot be directly met, is likely to be highly integrative. Some forms of art, such as the drama and fiction, supplement the instruction of the home and school and the more valuable actual social experience of the child, in that they are fertile sources of constructive daydreams. Some æsthetic activity, of course, may be actually disintegrating in the long run, in so far as it encourages narrow ideals and prejudiced thinking. But in the best drama and fiction, and in that biography which gives a living picture of a man's whole life, we have a powerful integrative force.

We are now in a position to see clearly that reasoning is a *sine qua non* of integration. Since the first reasoning of the child is very crude, and it is not for many years that he is able to achieve that genuinely rational thought which involves a freely varied attack and the logical comparing and testing of hypotheses, it follows that we should not expect a high degree of integration in the average child until he is approaching adolescence.

Piaget has shown to the author's satisfaction that the young child is not only illogical in his general manner of thinking, but that many special concepts which he has are vague, unanalyzed, and contradictory. At first he does not even distinguish between himself and the world, nor realize that his thought is merely subjective activity of his own, powerless to affect objects except through action. He thinks at first that his thought can influence events, that the sun, moon, and wind, the rivers, trees, and rain exist for his benefit. Later, leaving the stages of magic and animism, he believes still in an artificialist explanation of the world—that all things were made by men and for men. And when he acquires religious ideas he endows God with the power of human beings. It is only with great difficulty that the child finally

arrives at the notion that objects and events are related independently of human beings.²⁷

That the thinking of all normal children is at first as primitively anthropomorphic as the thinking of Piaget's boys and girls of Switzerland seems extremely probable. How could any child, no matter how gifted, be expected to pass from the infantile stage of thought which is much more primitive than that of the lowest savages, into the logical ways of thinking of highly civilized adults, without crude transition stages? Nor should we be surprised to find that many children never do reach the higher stages. Even if the average child does finally correctly answer questions about the origin of clouds and trees, and shows at last a generally and not partially adequate conception of physical causation, that does not mean that he is ready to apply that conception generally, least of all to human beings. Many a civilized adult whose conception of causation in the "physical world" is thoroughly rational is still partly in the stage of magic in his wishful thinking about human relationships, as prevalent beliefs in telepathy and spiritualism testify. There is no definite separation, as Piaget himself recognizes, between "child thought" and "adult thought"; and no sharp dividing lines between the various "stages" of thought. We would also insist that the progress of the thought of a child toward mature understanding is not only a gradual but a natural progress in which social factors are of the greatest importance.

Not only the rate at which children pass through the first primitive stages of thought but the degree to which their mature conceptions of the world and human life become rational are susceptible of control by adults, a point on which Piaget does not dwell. There are differences of opinion on the extent to which rational thought should be applied, but it would be generally agreed, probably, that the ability at times to see the world in an impersonal and objective way is essential to the attainment of what we might call "inner harmony." The child must learn sometime, if he is to lead an effectively integrated life, to look upon himself as merely one individual among an inconceivably large number of

²⁷ Jean Piaget, *The Child's Conception of the World*, Harcourt Brace, 1929; also *The Child's Conception of Physical Causality*, Harcourt Brace, 1930

others of the past and future as well as of the present, living in a vast world which is not organized with reference to their wishes. And so, by whatever means they may, those who bring up children will wish to help them outgrow their first crude ways of thinking and achieve rational standards for conduct, in order that sometime they may learn, as independent and mature personalities, thoughtfully to direct their own lives.

SUGGESTIONS FOR READING

Two new general books on personality must head our list. They are Gordon W. Allport's *Personality: a Psychological Interpretation*, a scholarly work in the philosophical tradition which might well have been written in pre-Nazi Germany, and Ross Stagner's *Personality*, scholarly too but not particularly philosophical, and a very readable and practical book. The latter book deals with social and economic factors in the growth of personality. . . . A book specifically dealing with children is Caroline Zachry's *Personality Adjustments in School Children*. . . . Psychological autobiographies which are particularly illuminating include, besides Leonard's *The Locomotive God*, mentioned in the text, Jane Hillyer's *Reluctantly Told* and Clifford Beers' remarkable book, *The Mind that Found Itself*. Both of these books have important implications for child psychology.

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